1958 METALWORKING YEARBOOK AND PLANNING GUIDE

JANUARY 6, 1958

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

19
YEAR OF THE MARKETEER
58

- *While the Boom Idles, Marketing Shifts Into High Gear,* PAGE 115
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TUBING PERFORMANCE and WORKABILITY BEGIN with the MELTING OF STEEL

Tensile strength, corrosion resistance, resistance to "creep" at elevated temperatures and reaction to heat treatment are only a few of the mechanical and physical characteristics of a steel which are controlled by chemical composition. In addition to analysis, "melting practice" controls such factors as the cleanliness of the steel, its grain size and its hot workability.

Chuck Connor, melter and *Bob Schriner, first helper* are shown making "additions" during the melting of a heat of alloy steel in one of B&W's electric melting furnaces. They know that what they add, and when and how they add it during the melting cycle helps make B&W Seamless Tubing easier for you to fabricate and gives the tubing optimum service life.

Years of experience and attention to detail and the coordinated efforts of the entire team of B&W technicians, furnace operators, metallurgists, engineers and chemists help make the name "B&W" the hallmark of tubing quality. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

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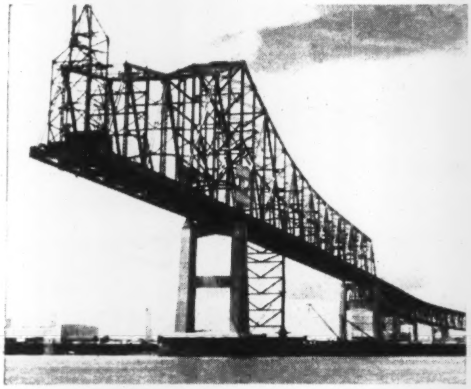
TUBULAR PRODUCTS
DIVISION

TA 6050-G5

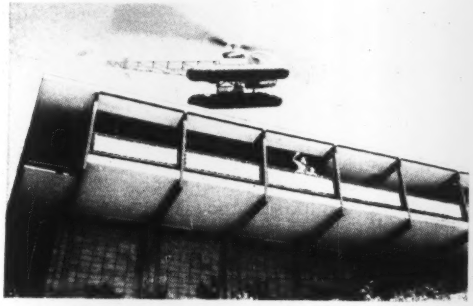
Seamless and welded tubular products, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels.

BETHLEHEM STEEL

News Briefs of 1957

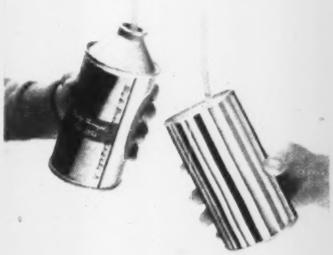


SPANNING OLD MAN RIVER—The Mississippi River lies far below the steelwork for the Greater New Orleans Bridge. The main cantilever span is 1575 feet, longest of its type in the United States. Bethlehem is supplying and erecting some 34,000 tons of steel for this monumental bridge.



STEEL HOME OF THE FUTURE—When commuting by 'copter becomes commonplace, your roof can be your own heliport. Only a rugged steel frame could stand the strain. And exposed steel framing is used more and more for its beauty. Bethlehem Pacific Coast Steel Corporation supplied the structural steel for this modern home in the California hills.

NEW STEEL CAPACITY—Throughout 1957, Bethlehem continued to expand and improve steelmaking facilities. When the program is completed at our Sparrows Point, Md., plant, for example, steelmaking capacity there will be 8,200,000 tons. This figure is larger than Bethlehem's total steel production in 1939 (7,958,000 tons).



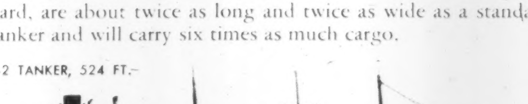
MORE SOFT DRINKS IN CANS! In 1957 it took more than 10 billion cans of all types—some 5 million tons of steel—to supply can makers' demands. Nowadays, more and more soft drinks and other good things to drink and eat come in cans. Bethlehem is a major supplier of tinplate—thin sheets of steel coated with tin—used in making cans.

TACONITE PELLETS—Some 7½ million tons a year of these small pellets of concentrated iron ore will soon be produced by Erie Mining Company's Minnesota taconite plant—largest iron ore processing undertaking in history. The project, in which Bethlehem has a substantial interest, began actual production of pellets in late 1957.

SCALE MODEL OF RESEARCH CENTER—Early in the year, plans were announced for construction of a basic steel research center on a 1000-acre site adjoining the Lehigh University campus, and overlooking our plant and general offices at Bethlehem, Pa. Here Bethlehem scientists will have superb facilities for carrying on vital research projects.

GIANT TANKERS—Contracts awarded to Bethlehem's Shipbuilding Division during the year included a number of tankers ranging from 25,000 to 106,500 tons. The latter, to be built at our Quincy, Mass., yard, are about twice as long and twice as wide as a standard wartime tanker and will carry six times as much cargo.

T-2 TANKER, 524 FT.



SUPERTANKER, 937 FT.

MAKING STEELMAKING SAFER—For the fifteenth consecutive year a Bethlehem plant has won first place in the annual safety contest sponsored by the Metals Section of the National Safety Council. Our Sparrows Point, Md., plant won first place among all large steel plants in the nation. The Bethlehem, Pa., plant won second place, and the Johnstown, Pa., plant third.

BETHLEHEM STEEL

COMMERCIAL Custom Forging for every industry...

Clark Equipment Company 180 Turbo-Dozer

Forged ball-joint housing saves 90¢ plus 10% on machining

Clark Equipment Company switched to upset forgings for its ball-joint housings with impressive results. The part used for the steering and driving mechanism of its line of Four-Wheel Drive MICHIGAN End Loaders and Turbo-Dozers was formerly produced as a steel casting.

After the housings were turned out by Commercial as closed-die forgings on an 8-inch upsetter, Clark Equipment reported:

1. A 15 lb. saving of metal through a weight reduction from 95 to 80 lbs.
2. An initial cost saving of 90¢ per part.
3. Closer tolerances—some dimensions even to finished size—for a 10% machining cost saving.
4. No rejects due to hidden metal faults.

Now, this important component not only costs Clark less but also provides the strength, inherent in all forgings, to resist unusual operating strains and assure longer, trouble-free performance.

Many parts like this unusually shaped housing, which were formerly considered impossible to forge, are now routine at Commercial. An early check with Commercial's forging engineers on your particular component forming problem will prove it to you—may save you time, money, help improve performance.

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Check your part forming problems against this list of "bench marks" for parts requiring:

- **Reduced weight, thinner section, greater strength.**
- **Consistent soundness—no losses due to porosity.**
- **Good appearance—smooth, close-grained surface.**
- **Superlative shock and fatigue resistance.**
- **Uniform response to heat treatment.**
- **Cost-cutting advantages in finishing—less waste metal, reduced machining, no rejects due to hidden flaws.**

Address The Commercial Shearing and Stamping Company, Dept. L-2, Youngstown 1, Ohio.

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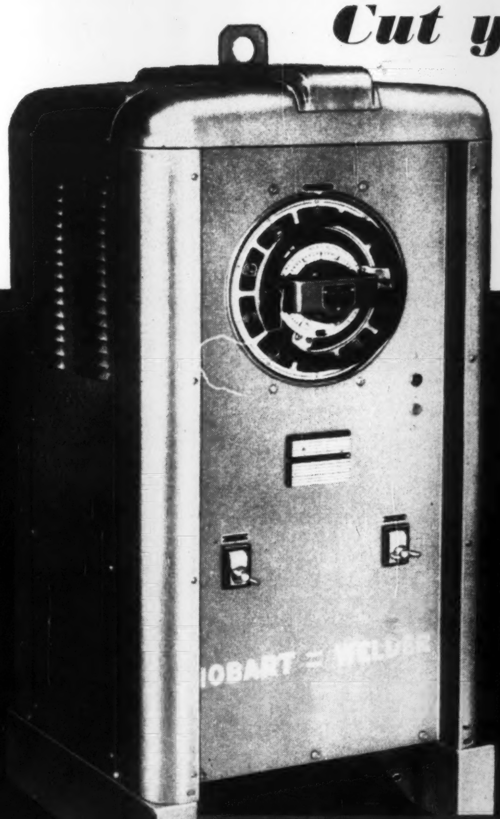
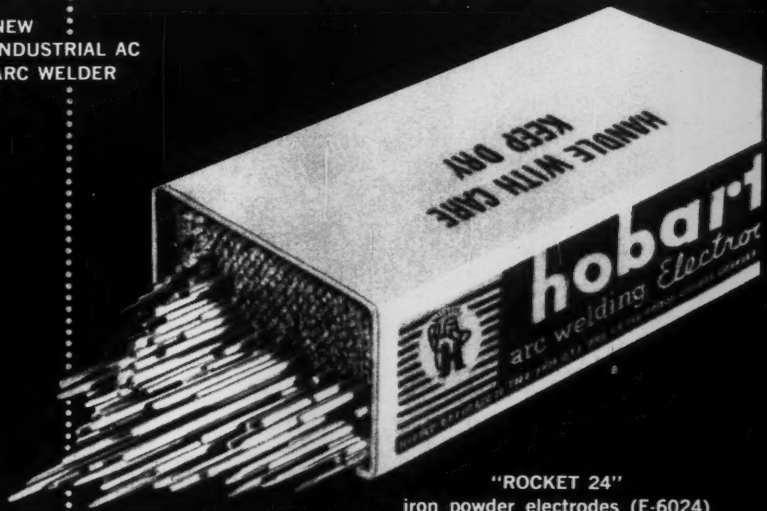
...using HOBART AC welding with HOBART "ROCKET" electrodes



NEW
INDUSTRIAL AC
ARC WELDER



"ROCKET 24"
iron powder electrodes (E-6024)

...here's WHY!

YOU GET THE FOLLOWING UNIQUE FEATURES IN—

THE NEW HOBART AC TRANSFORMERS	"ROCKET 24" ELECTRODES
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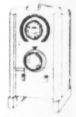
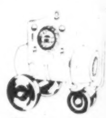
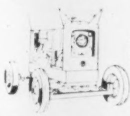
* Current Overload Protection	* Self-Removing Slag
* Dual Control & Remote Control	* Easy-to-Use & Control
* Ample Power Factor Correction	* Have Excellent Mechanical Properties
* No Moving Coils or Cores	* Very Little Spatter Loss
* Recessed Panel to Protect Controls	* Can Use Higher Amperages
* Push Button Starting Safety	* Produce Finely Rippled High Quality Bead
* Quiet Operation	* For AC or DC, Straight or Reverse Polarity
* Inbuilt Magnetic Line Switch	* For General Purpose Use
* Shrouded Fan Super Cooling	* Can Double Deposition of Conventional E-6012

You'll really slash production costs when you combine all these features!


1. AC WELDER

2. RECTIFIER


3. ELECTRIC DRIVE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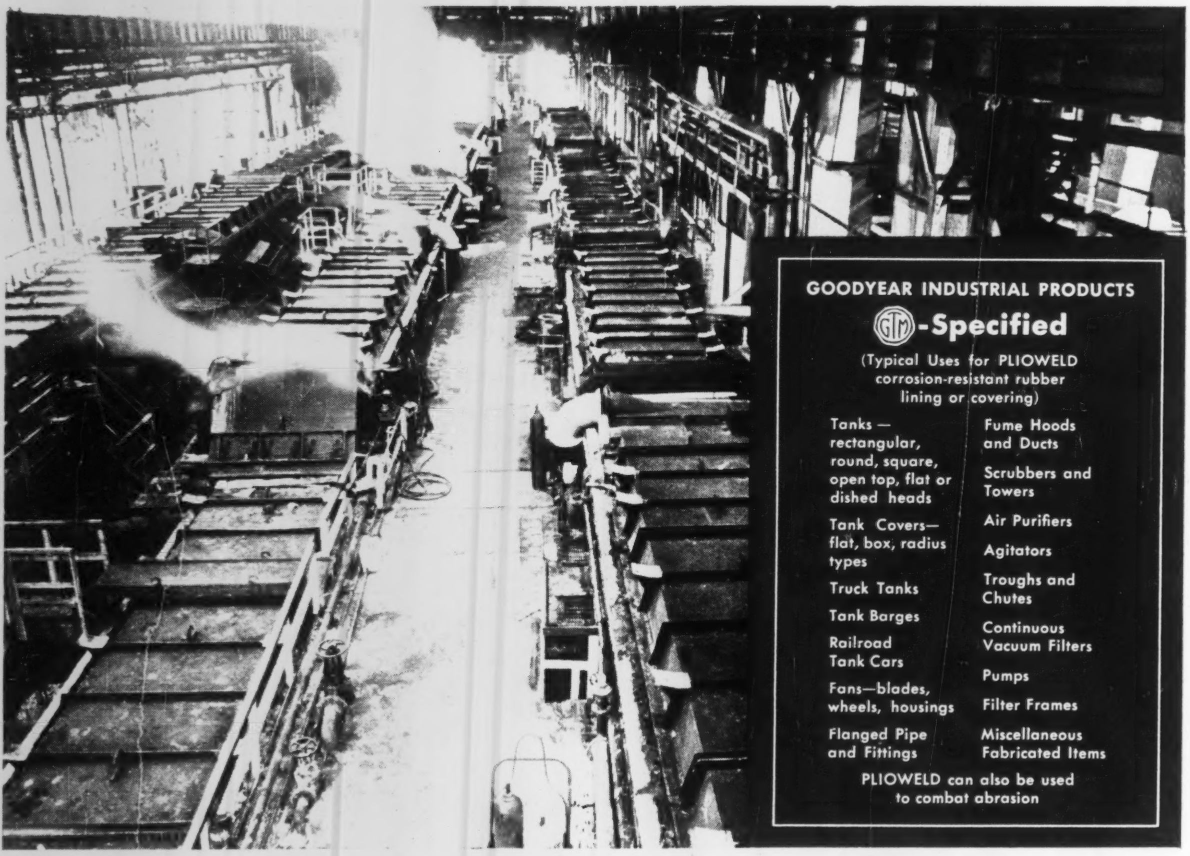
Our work is ______
Name ______
Firm ______
Address ______
City ______ State ______
Also send information on: _1 _2 _3 _4



GOODYEAR INDUSTRIAL PRODUCTS

G.T.M.-Specified

(Typical Uses for PLIOWELD corrosion-resistant rubber lining or covering)

- Tanks — rectangular, round, square, open top, flat or dished heads
- Tank Covers—flat, box, radius types
- Truck Tanks
- Tank Barges
- Railroad Tank Cars
- Fans—blades, wheels, housings
- Flanged Pipe and Fittings
- Fume Hoods and Ducts
- Scrubbers and Towers
- Air Purifiers
- Agitators
- Troughs and Chutes
- Continuous Vacuum Filters
- Pumps
- Filter Frames
- Miscellaneous Fabricated Items

PLIOWELD can also be used to combat abrasion

Keeps pickle line perking for 17 years

Keeping a giant-size pickling line in steady production is no little trick. Especially in a big-name steel mill like this one—turning out millions of tons a year.

Their 25% sulphuric pickling solution wages constant acid attack on whatever equipment used. And the above-average 225°F. operating temperatures are especially hard on rubber—preferred linings for most pickling tanks.

Right from the beginning, the G.T.M.—Goodyear Technical Man—saw these tough conditions as a good spot for PLIOWELD—the acid- and abrasion-resistant rubber by Goodyear. How right was he? At last report, the PLIOWELD tank linings *had given 17 straight years of more-than-satisfactory service—still looked good for many more.*

That's no rare case, either. Wherever the G.T.M. tackles a problem—and solves it with a super-quality Goodyear product like PLIOWELD linings—you can count on exceptional service. Give him a try by contacting your Goodyear Distributor—or writing:

Goodyear, Industrial Products Division,
Akron 16, Ohio.

PLIOWELD TANK LININGS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Plioweld—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

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The Metalworking Weekly

January 6, 1958
Vol. 142 No. 1

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behind the scenes

Eloquent Praise

Perhaps we have been unduly influenced by the television advertising of a certain swept-wing automobile, which is being plugged by a band-leading refugee from South Dakota and an announcer who sounds like a man who has just seen the light. As the music fades, the swept-wing evangelist enters the first stage of a slow elocutionary convulsion, and when that boy gets off the ground, Jack, he ain't just floating.

We are reminded of stylish plugs because the book you are now holding rates more than just a polite introduction; it merits a fanfare, a long roll, and a 21-gun salute.

Yes, sir, folks, here she is: The ONE, the ONLY, the MOST ADVANCED, the GREATEST Yearbook STEEL ever produced. (Although the 1957 Yearbook was a trifle fatter than this one.) You'll be amazed at the fantastic styling of the provocative introduction by Editor Walt Campbell; at the exciting array of facts and figures; at the complete, easy-to-read contents page. Yes, ladies and gentlemen, this carefully engineered contents page enables you to PICK OUT ANY SUBJECT OF INTEREST TO THE METALWORKING WORLD, and find it at once by effortless fingertip control—just by turning a few pages! And what will you find on those pages? Friends, let me tell you: You'll find breathtaking information, powerfully assembled by editors and advertisers—you'll derive useful intelligence faster—you'll sense the surge of smooth, efficient writing.

We call your attention now to the 1958 YEARBOOK's exciting new low silhouette. It is scarcely more than 4 picas from desk top to glamorous cover—real desk-hugging ruggedness—the new look of standard reference. Designed and edited to be years ahead, the 1958 Yearbook is a perfect blending of editing and advertising. Thank you.

Now that we're back on the ground again, let's proceed with more decorum. As usual, the Yearbook began to take shape in October. Editors, artists, engravers, printers, and associated workers devoted increasing amounts of time to it until by the middle of December it resolved itself into a torrent of proofs. The leading editorial article concerns marketing. Its title appears to have been influenced by Chinese thinking of earlier dynasties: You know, they referred to certain years as the year of the monkey, or the year of the dragon. Editor Walt Campbell calls 1958 "The Year of the Marketeer." While the boom idles, he says, marketing will shift into high gear. His opinion is supported by thousands of metalworking managers participating in STEEL's annual survey of business expectations.

The survey of managements' opinion this year is of greater interest than usual. Here you will find what the managers of metalworking plants expect in dollar sales volume, employment, selling prices, unit manufacturing costs, expansion, product development, research, and profits. The editors asked 7500 managers for this information. We'll have to admit their answers were way over our flat head, but you can be sure they were screened, weighted, reduced to percentages, and subjected to all the other scientific jazz we don't understand.

Metalworking Facts and Figures is a compendium of the metalworking industry. Compiled by STEEL, it appears for the tenth consecutive year and includes all the figures you need on production, sales, labor, prices, and earnings in metalworking—the world's biggest industry.

The Forum on Technical Progress brings you right up to date on today's technology and tomorrow's developments. Hundreds of authorities give you an inside look at such things as heat treating, lubrication, forming, and casting.

Describing this 1958 Yearbook can do nothing more than stir a little interest. You've got the original article in your hands—so go ahead and brief yourself. If there are any sections that interest you deeply, you may ask for tearsheets.

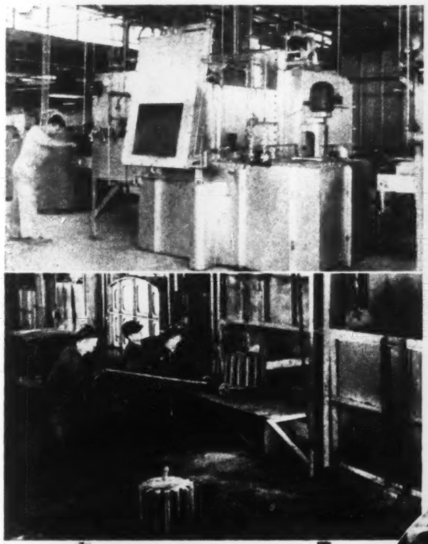
Shrdlu

(Metalworking Outlook—Page 109)

WHEN IT COMES TO HEAT TREATING—

"Do-It-Yourself" can sometimes be costly

Buying equipment and supplies to perform heat treating operations within your own plant is only one step in many that must be considered when contemplating the installation or expansion of a heat treating department.

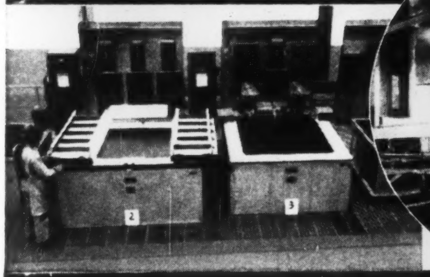


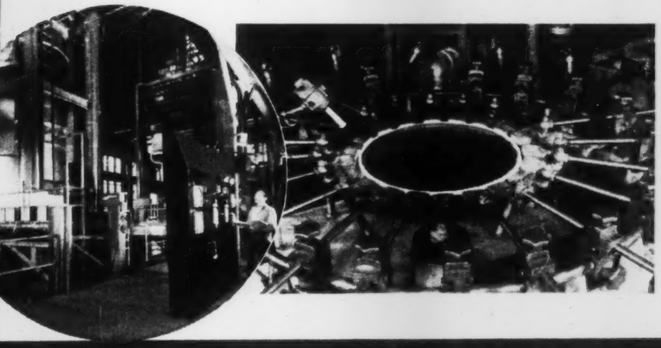
Here are some of the factors that should be included when figuring the cost of operating your own heat treating department—of "doing-it-yourself" when it comes to heat treating:

- **Technical skill:** Trained operators whose skill is the result of years of experience are essential
- **Maintenance:** Rapid deterioration of equipment occurs unless there is constant repair, maintenance, and skillful handling of the equipment
- **Quality control:** Testing equipment and skilled operators are necessary to maintain uniformity and quality control of all heat treating operations
- **Sufficient equipment and supplies:** A great variety of equipment is needed to meet the requirements of annealing, brazing, hardening, carburizing, stress relieving, nitriding, and all other heat treating processes; and an endless variety of materials and supplies must be kept on hand.

These problems and many more have been solved by commercial heat treaters. They have the answers because heat treating is their business.

Every MTI commercial heat treater listed here is a specialist with complete service facilities under one roof. Each one has the facilities, equipment, skill and experience which will enable him to meet your most exacting heat treating requirements.





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Dayton 3, Ohio
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Dallas, Texas
Drever Company
Philadelphia 33, Pennsylvania
Greenman Steel Treating Company
Worcester 5, Massachusetts
Fred Heinzelman & Sons
New York 12, New York

Alfred Heller Heat Treating Co.
New York 38, New York
Hollywood Heat Treating Co.
Los Angeles 38, California
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Toronto, Ontario, Canada
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Rockford, Illinois
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The Lakeside Steel Improvement Co.
Cleveland 14, Ohio
Metallurgical, Inc.
Minneapolis 14, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri

New England Metallurgical Corp.
South Boston 27, Massachusetts
Owego Heat Treat, Inc.
Apalachin, New York
Paulo Products Company
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
Pittsburgh Metal Processing Co., Inc.
Pittsburgh 15, Pennsylvania
The Queen City Steel Treating Co.
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Lansdale, Pennsylvania
Stanley P. Rockwell Company
Hartford 12, Connecticut
C. U. Scott & Sons, Inc.
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Detroit 10, Michigan
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Syracuse, New York
Temperature Processing Co.
North Arlington, New Jersey

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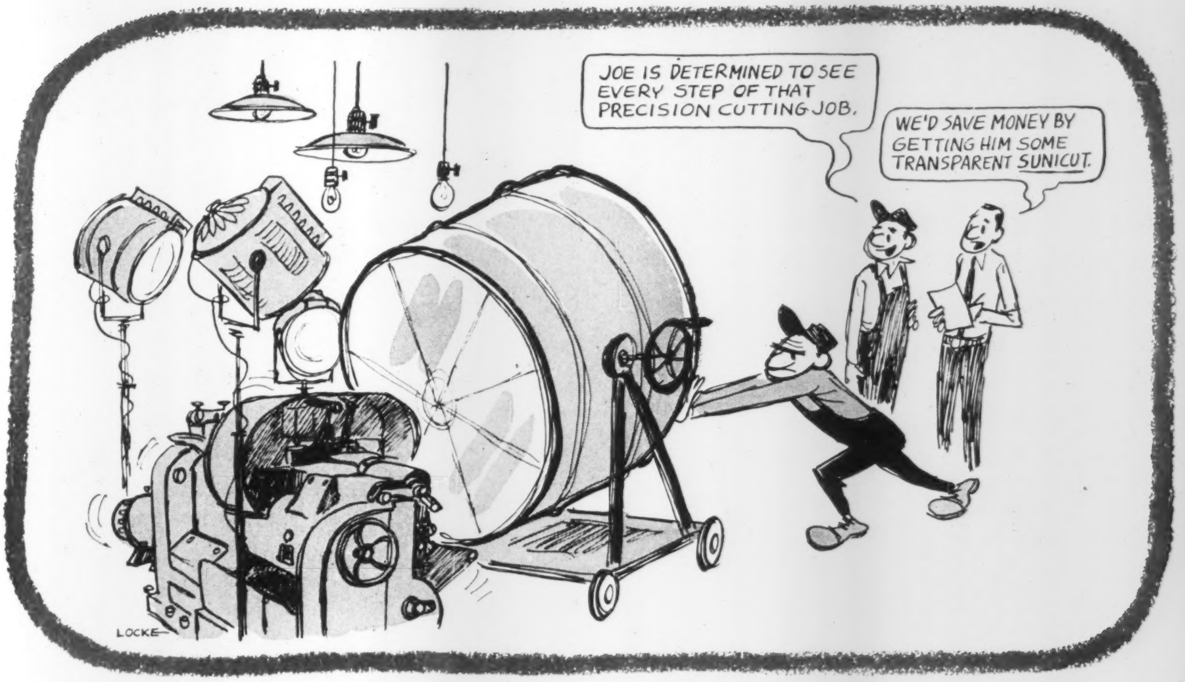
JOE IS DETERMINED TO SEE EVERY STEP OF THAT PRECISION CUTTING JOB.
WE'D SAVE MONEY BY GETTING HIM SOME TRANSPARENT SUNICUT.
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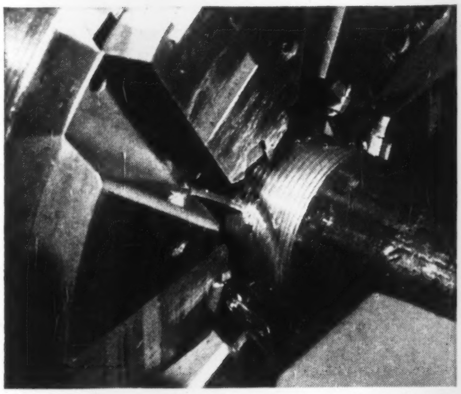
For precision cutting . . .

TRANSPARENT SUNICUT OILS ASSURE YOU GOOD VISIBILITY, PEAK PRODUCTION



Transparent Sunicut oils assure excellent finish in critical operations at close tolerances. Good visibility speeds production.

Transparent Sunicut® oils, including heavy-duty and dual-purpose oils, are available in many grades to suit your specific needs. They give outstanding results... especially where precision cutting is required.

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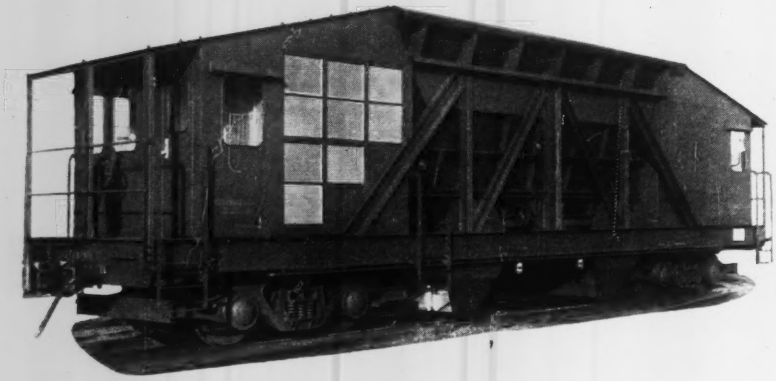
ATLAS

diesel-electric

ORE-TRANSFERS



75-ton diesel-electric transfer, single hopper, bottom dump with air-operated discharge gates and double-end control.

Atlas builds steel plant cars to fit the exacting needs of each user. And each is constructed with the simplicity and ruggedness that defies obsolescence.

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LETTERS
TO THE EDITORS

STEEL Used as Guide

Since we are in steel product sales (with considerable business in stainless steels), your Trends-in-Metals article, "Stainless Steels" (Nov. 4, Page 107), is most interesting and informative. We would appreciate six copies.

You have a splendid magazine which I read every week and use as a guide in our business relations.

Joseph A. Rigby
Associate
David W. Jones Jr.
Manufacturers' Representative
Denver

Great Use to Company

I would appreciate two copies of these articles from your Dec. 9 issue: "A Way To Speed Analysis" (Page 156) and "pH Controls Rinse for Bright Dip Unit" (Page 203). They could possibly be of great use in our processes.

Norbert J. Comeau
Electralab Inc.
Subsidiary of Farrington Mfg. Co. of Boston
Needham Heights, Mass.

Looks Forward to '58 Articles

DECEMBER
1958

May I express my appreciation for prompt delivery on reprints of your 1957 Program for Management articles. I have found them not only interesting but educational. I am looking forward to your 1958 Program for Management articles.

Thomas I. Dwyer
Supervisor, Statistical Section
Diamond Chain Co. Inc.
Indianapolis

Query on Valves

We have received your magazine for many years, and I, for one, enjoy reading it every week.

In the article, "Valve Sales Hit Record" (Dec. 2, Page 63), you quote a figure of $160 million sales for this year. Does that figure include aviation and industrial users? Or is it just made up of solenoid operated hydraulic valves used by machine tool manufacturers and industrial manufacturing plants?

As manufacturers of pneumatic and hydraulic equipment, we will be coming out with a line of solenoid hydraulic valves soon. Hence, our interest in your article.

J. C. Gurmendi
President
Alkon Products Corp.
Hawthorne, N. J.

• *The figure represents sales of all industrial hydraulic control valves—in-*

(Please turn to Page 12)

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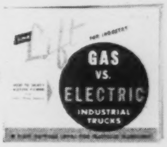

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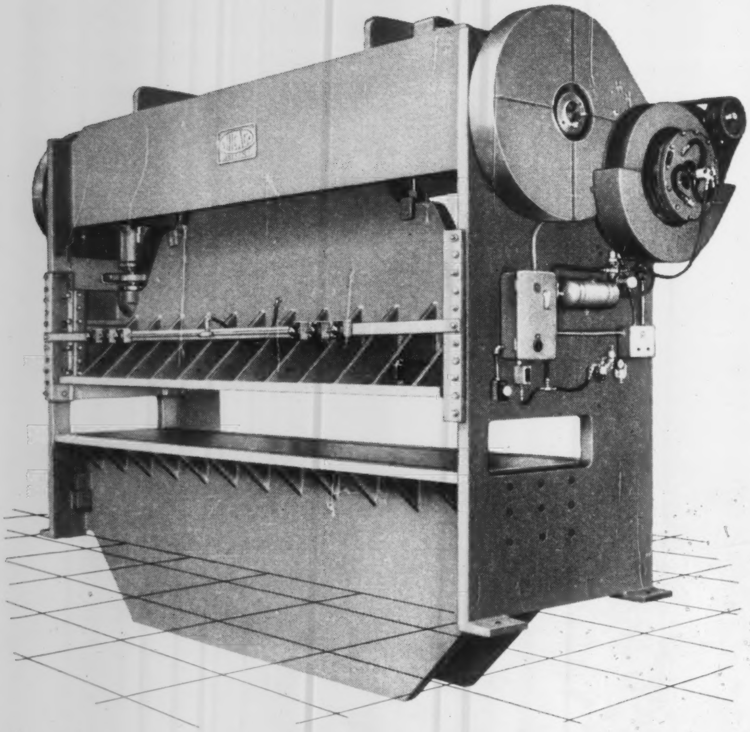

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LETTERS

(Concluded from Page 10)

cluding solenoid-operated types and all others.

The figure is limited to sales made to industrial manufacturing plants. It does not include sales for aircraft or similar applications.

Short Run Die Is Shortcut

The articles, "Short Run Dies Offer Long Life" (Dec. 2, Page 94) and "Steel Rule Dies Catch On" (July 22, Page 100), are of special interest to us since they follow our line of work. Is it possible to receive several copies of each?

D. W. Coppess
General Foreman
Stanhope Products Co.
Brookville, Ohio

Article Shown in Washington

Your Program for Management article, "Small Business—Its Place in Our Future" (Nov. 11, Page 99), is splendid. I have distributed it in our various offices, including that of Wendell B. Barnes, administrator of the Small Business Administration. He, too, has found it interesting. I believe you have made a good contribution.

Arthur Hachten
Director
Office of Information
Small Business Administration
Washington

Likes Annealing Story

I found the article, "Prepared Annealing Atmospheres" (Nov. 18, Page 160), interesting. I would like two copies for distribution to our engineering office and technical library.

H. L. Meredith
Vice President
Airline Welding & Engineering
Hawthorne, Calif.

Breath of Fresh Air

I would like permission to reprint your editorial, "Parable of the Prices" (July 15, Page 51), as a bulletin that I can send to my distributors and their salesmen. I saw it reprinted in the October issue of *Advertisers Digest.*

The plumbing wholesalers to whom I sell have been crying bitter tears because their profit margin is so small. This article should serve as a breath of fresh air and help reappraise their thinking as to why their profit margin is shrinking.

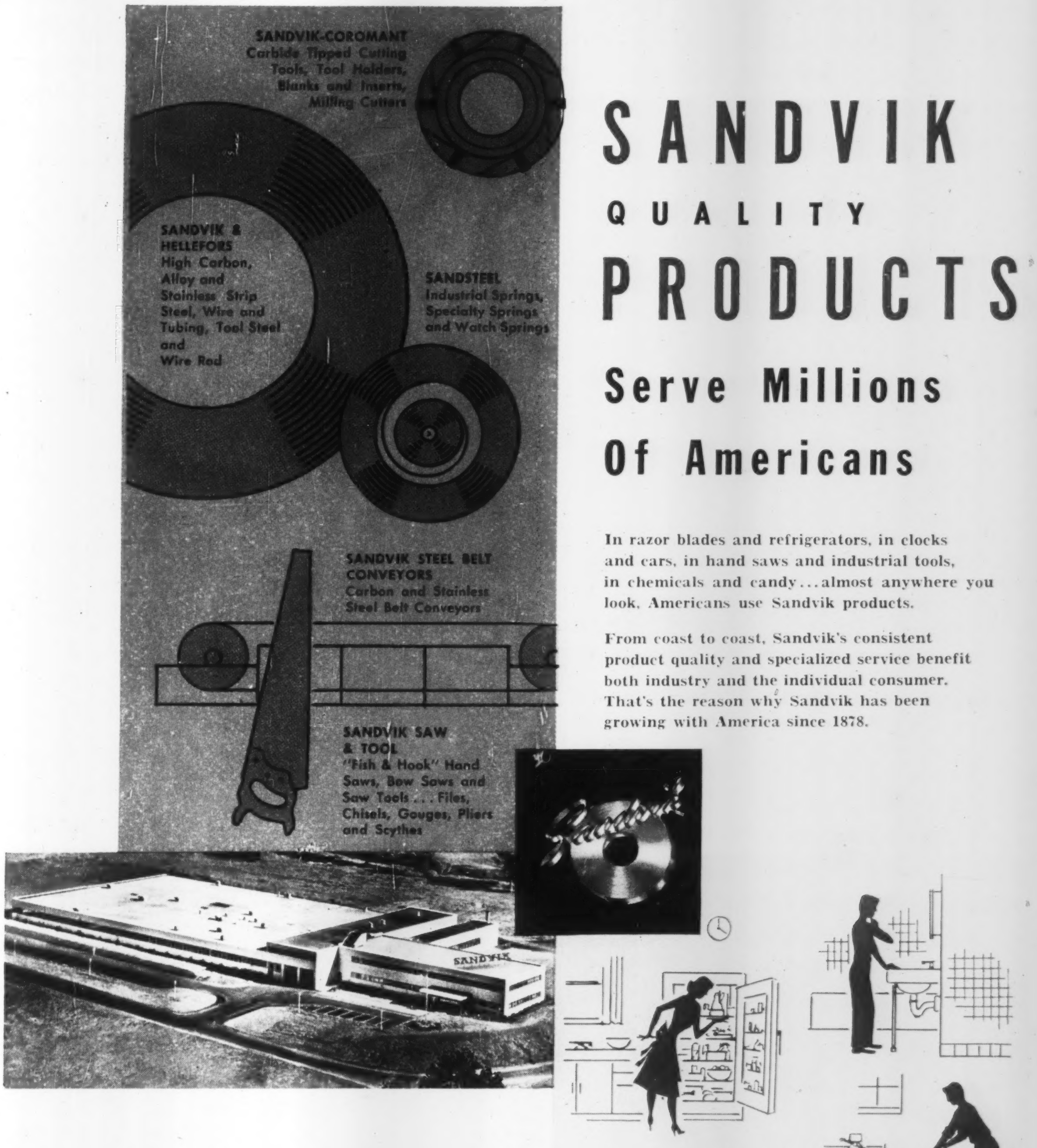
I have been selling for 23 years, and I learned long ago that the last thing a salesman should sell is price.

Al Evans
President
Nyco Products Co.
Chicago

Indispensable Publication

Your magazine has become indispensable because of its excellent material. Kindly send me copies of these articles from the Oct. 28 issue: "Metal Selection Puts Plus in Profits" (Page 162), Metal Selector (insert), and "The Case for Direct Reduction" (Page 180).

V. S. Kudva
Technical Director
Canara Workshops Ltd.
Mangalore-3, India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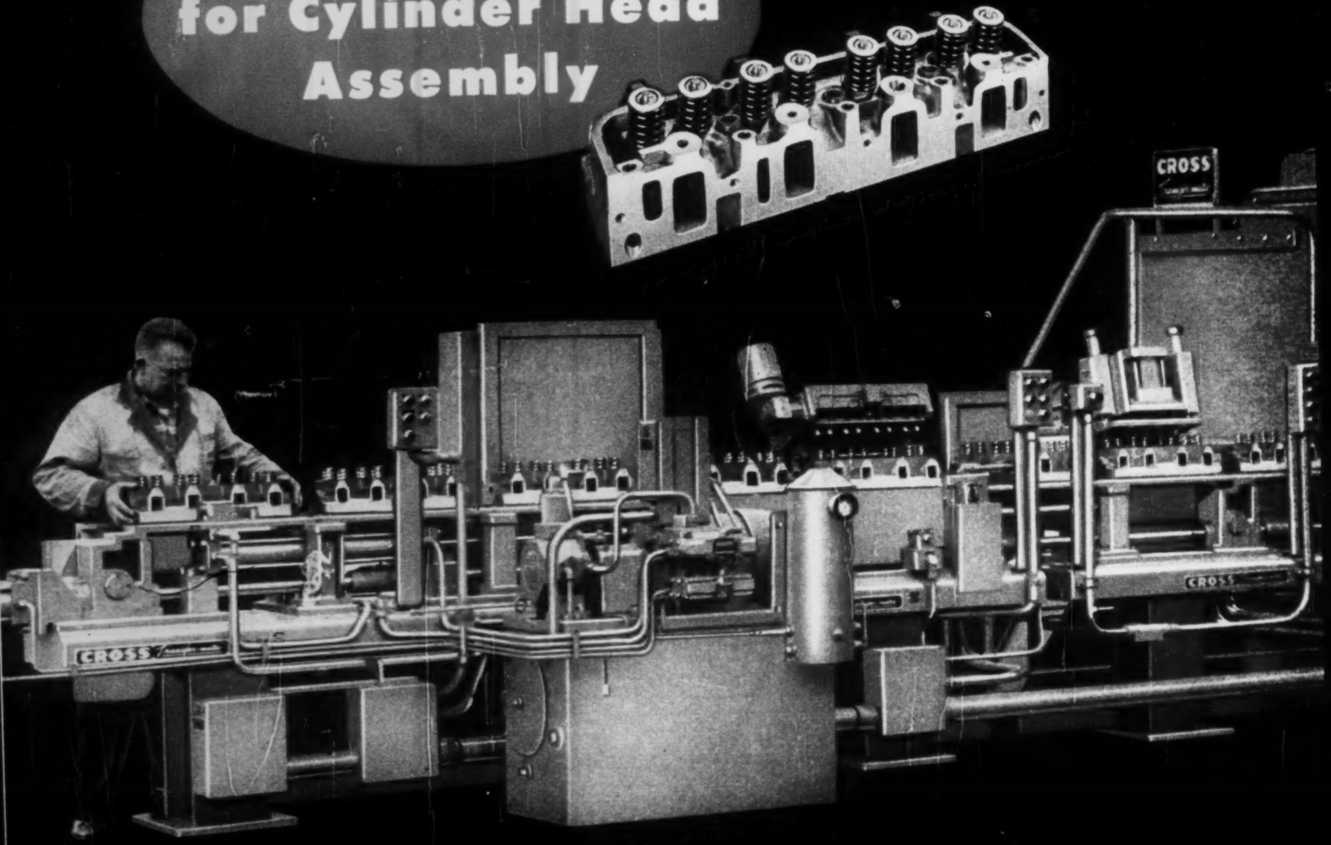
Automation for Cylinder Head Assembly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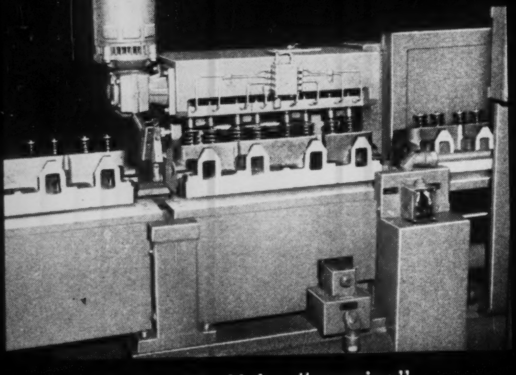
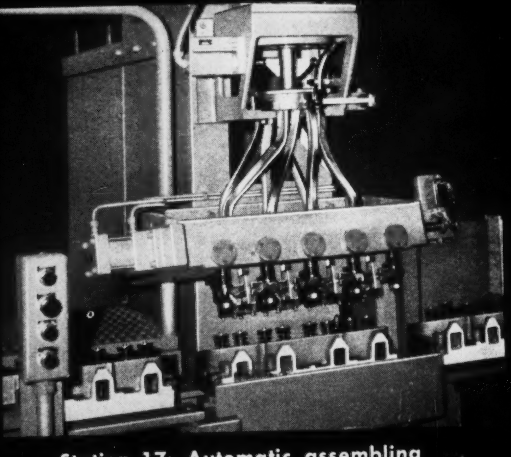
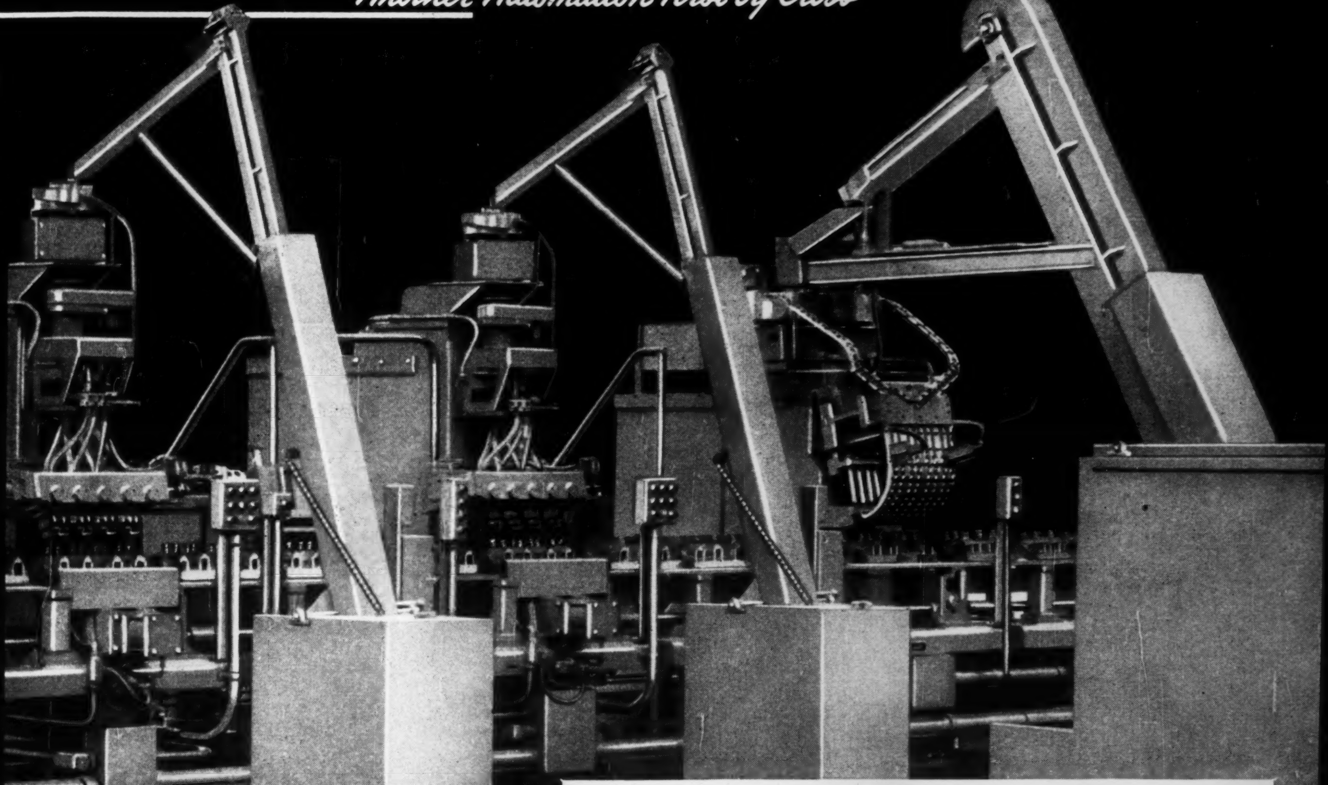


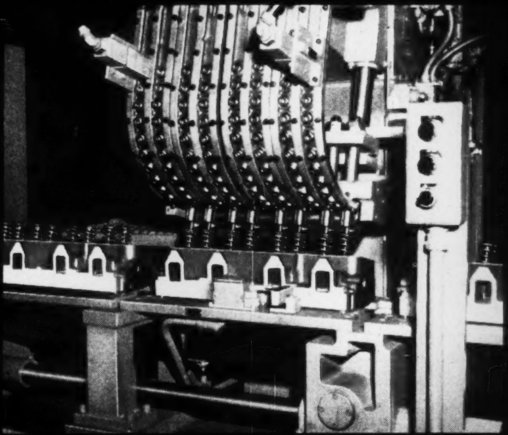
Station 25: Valve "popping".



Station 17: Automatic assembling of valve locks.

Another Automation First by Cross





Station 13: Automatic assembling of valve spring retainers.

Cross—pioneer in assembly automation—now introduces another machine to assemble V-8 cylinder heads at a rated capacity of 310 per hour.

Cylinder head castings with intake and exhaust valves in place are loaded automatically at Station 1. At Stations 3, 4, and 5, rubber grommets are placed over the valve stems. At Station 7, an inspection is made for faulty valves and grommet positioning. If necessary, heads are removed, repaired and returned at Stations 8, 9, and 10. Valve springs, spring retainers and spring retainer sleeves are automatically assembled at Stations 11, 13, and 15 respectively. Valve locks are automatically assembled at Stations 17 through 23 with standby units for manual assembly at Stations 19 and 23. At Station 25, all valves are "popped" before unloading the finished assemblies at Stations 27, 28 and 29.

A unique feature of the machine is the transfer mechanism which lifts and carries the parts between stations to eliminate pallet fixtures used by older assembly machines.

Building block construction provides flexibility for engine design changes and for additional automatic assembly devices of the future.

Like other Cross machines, all parts—even tooling details—are made to interchangeable tolerances for fast, easy maintenance. Other features include construction to JIC standards and automatic lubrication.

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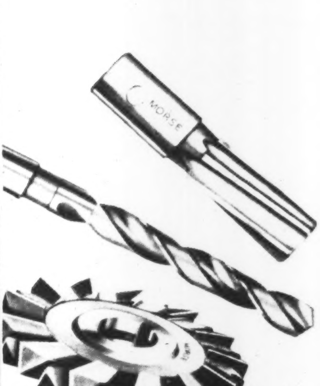

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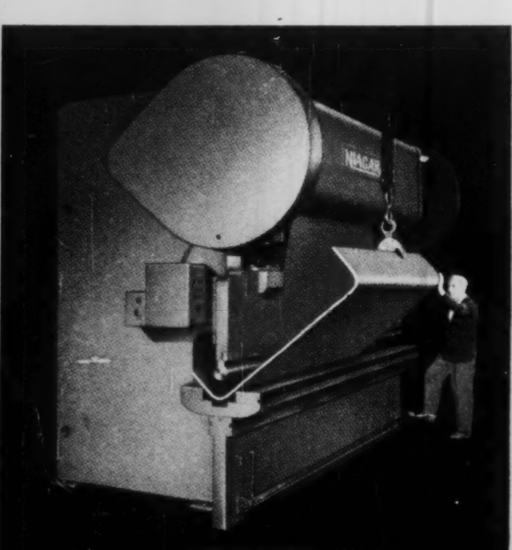

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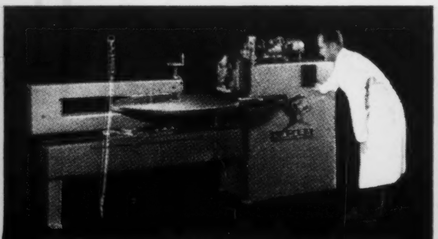

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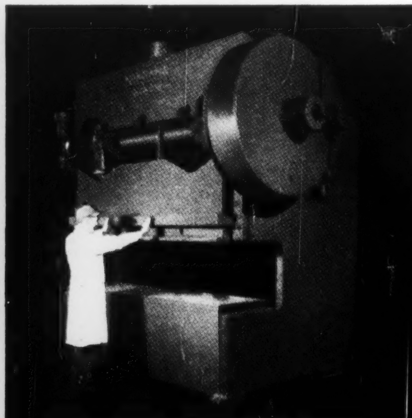

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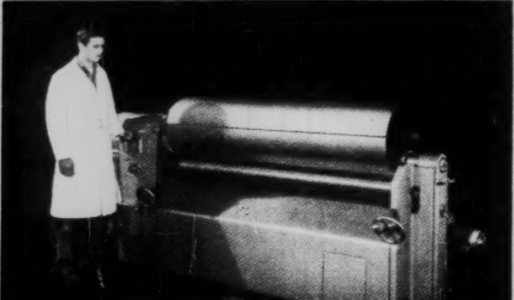

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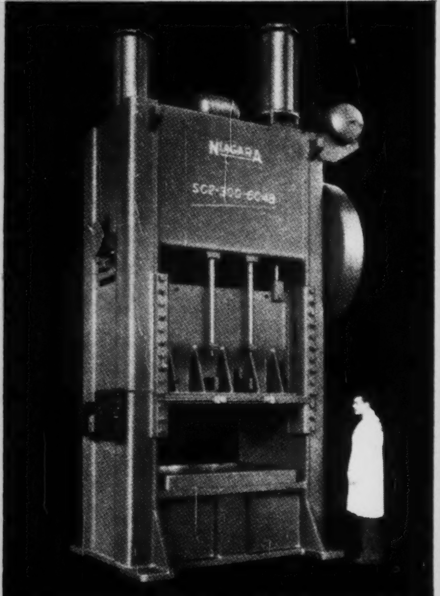

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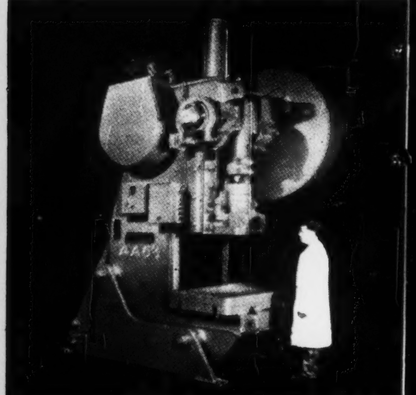

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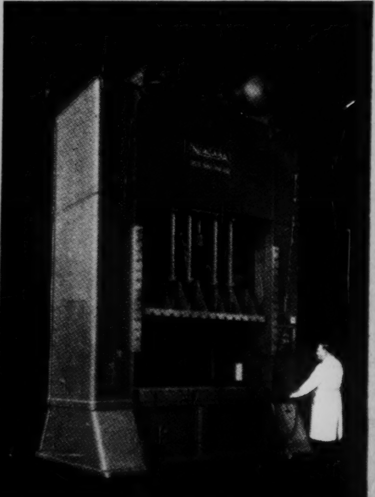

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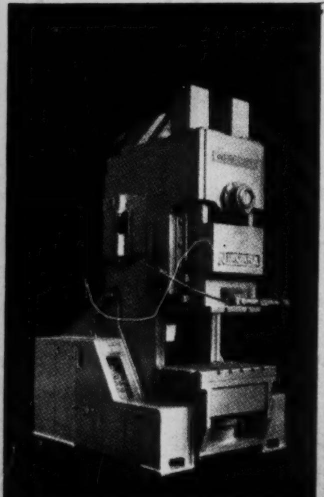
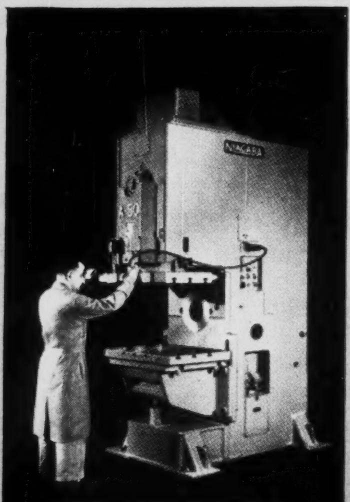


FRONT-TO-BACK CRANKSHAFT
OPEN BACK INCLINABLE PRESSES
Standard and automation models.
75-200 ton capacities.



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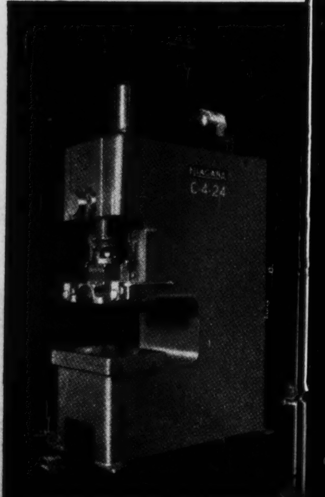

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DEEP THROAT PRESSES
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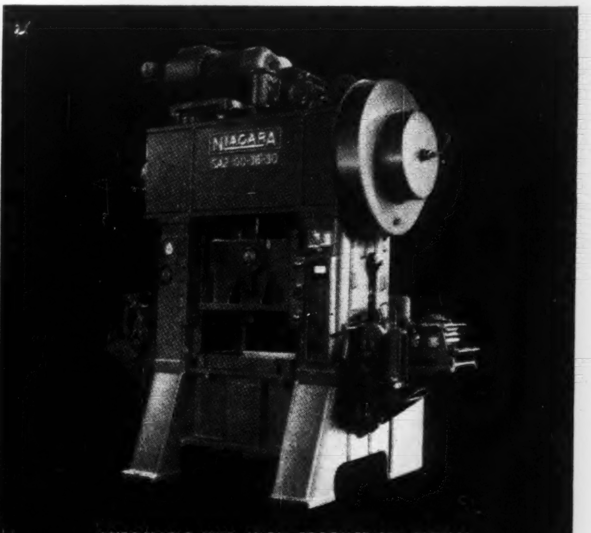

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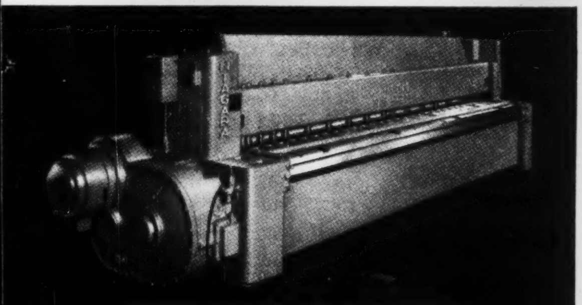

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Whatever you require — power presses or hand tools — Niagara is the line that can do the most for you. It is the most complete in the industry . . . the most advanced in engineering. You can consult a Niagara representative with complete confidence of unbiased recommendations. Niagara has the right machines and tools for your requirements.

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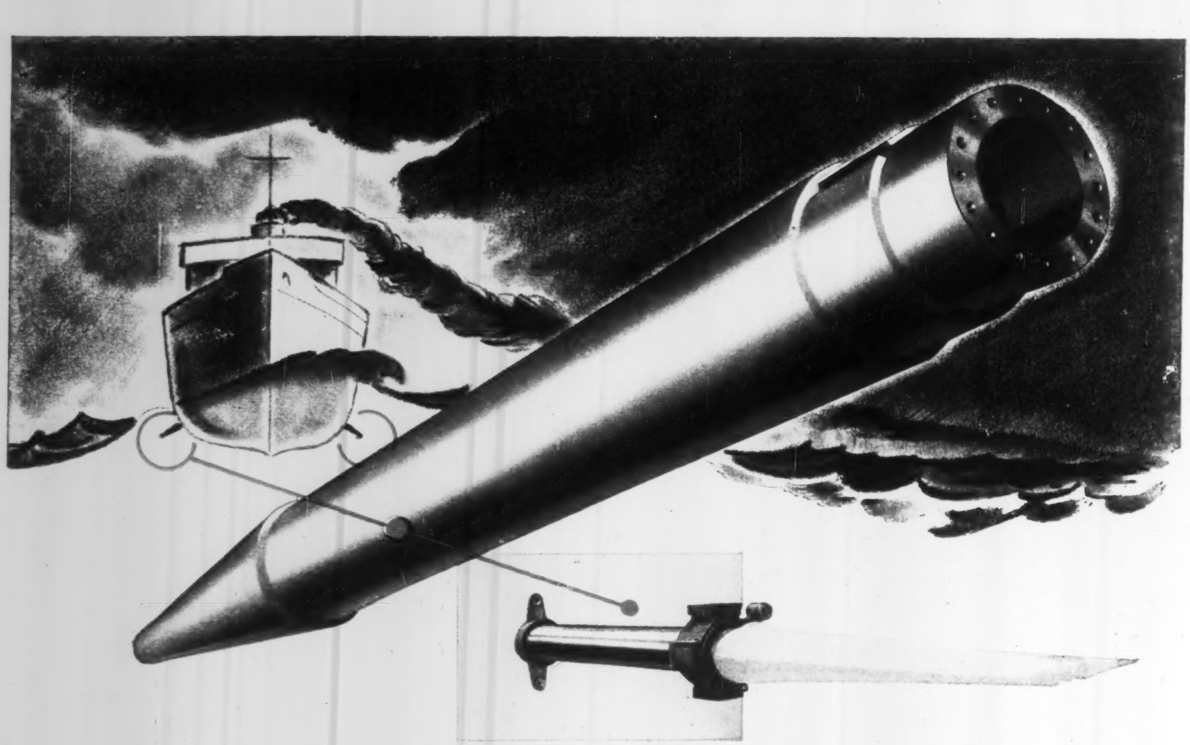

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"Giant Muscle" to Fight the Sea

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Forged and machined to 35,000 pounds, this steel shaft is 29 feet 8 inches long. Body diameter is 25¾ inches and the shaft is bored and honed to 14 inch diameter 17½ feet in from the flange end.

Bearing the brunt of storms at sea, this "giant muscle" is at the heart of modern stabilizers in ships of widely diverse tonnage plying the seven seas today. Another example of the versatile capabilities available at Erie Forge & Steel. Strict quality control from raw materials to finished steel forgings and castings within our own plants are yours here "Under One Responsibility and One Control". Your nearest field sales engineer will be in very soon to discuss your requirements with you.

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MEMBER AMERICAN IRON AND STEEL INSTITUTE

Shows Set for '58

THE 1958 industrial exposition season will open with the Plant Maintenance & Engineering Show in Chicago's International Amphitheatre on Jan. 27. Clapp & Poliak Inc., New York, is managing the exposition.

Chicago's International Amphitheatre also will be the scene of the 1958 Nuclear Congress, Mar. 17-21. This year, the International Atomic Exposition usually held with the Nuclear Congress, and the Atomfair, held concurrently with the Atomic Industrial Forum, have been consolidated into one show. It will be managed by International Atomic Exposition Inc., Philadelphia.

American Welding Society's annual show will be held for the first time in Kiel Auditorium, St. Louis, Apr. 15-17.

The American Society of Tool Engineers' tool exposition will be in Philadelphia's Convention Center, May 1-8. It will be held concurrently with ASTE's 26th annual meeting.

A third metal show will be launched this year by the American Society for Metals. Dallas will be host to the first Southwestern Metal Congress and Exposition, May 12-16 in the Automobile Bldg., at the State Fair Park. This show is scheduled to alternate with the biennial Western Metal Congress and Exposition.

Cleveland's Public Auditorium will be the scene of three major industrial shows this summer and fall. Clapp & Poliak Inc., New York, announced the National Materials Handling Exposition, which it manages, will be held there June 9-12. The American Society of Mechanical Engineers will sponsor a national conference on material handling to run concurrently.

On Sept. 23-26, the Association of Iron & Steel Engineers' exposition and annual convention will move into Cleveland. It will be followed on Oct. 27-31, by the American Society for Metals' annual National Metal Congress & Exposition.

For other major meetings and shows, see Page 421.

Udylite Machine and Process combine to set new Scripto standards

The Udylite Cyclemaster provides the accuracy and steady flow of production. Udylite Bright Nickel furnishes the sparkling finish. Together they solve for Scripto, of Atlanta, Georgia, the knotty problem of better finish of the Scripto pens, pencils and cigarette lighters.

Scripto's first bright nickel was the Udylite #31 process. It was superseded by the Udylite #514 process to gain the faster brightening which is so important in nickel plating to a high luster with a thin coat.

The adoption of Udylite Bright Nickel Process #724 was the next step as it offered still faster brightening and even more important all the time saving advantages of all liquid brighteners.

Step by step Scripto has lowered costs and improved quality with Udylite Processes and Precision Automatic Plating. Here is just one of many examples of the right application of process and equipment. Out of the line of Udylite products can come the answer to your problem as well.

Contact your local Udylite Sales Representative . . . let him show you how the *right* combination of Udylite processes and machines can improve your quality and production.

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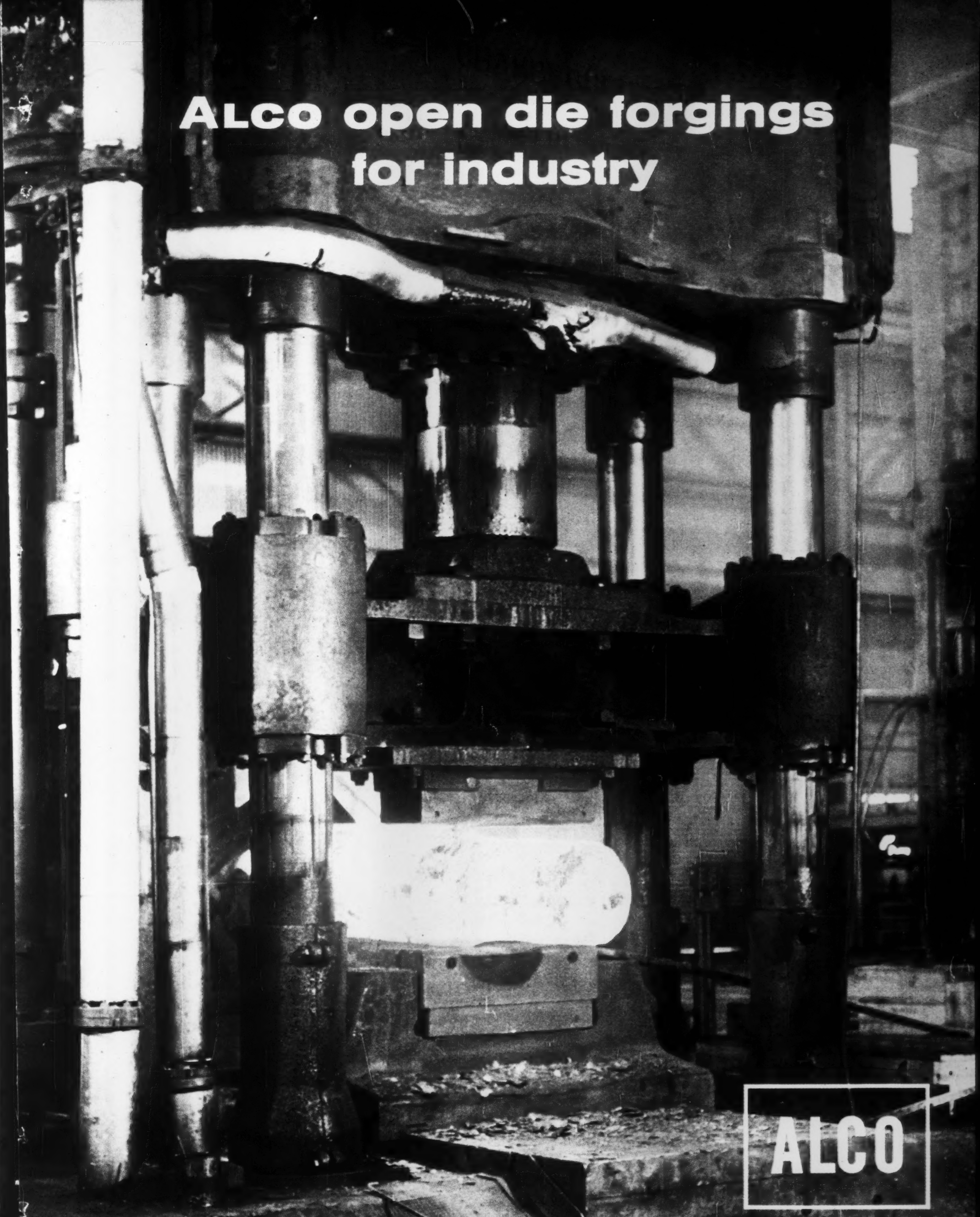
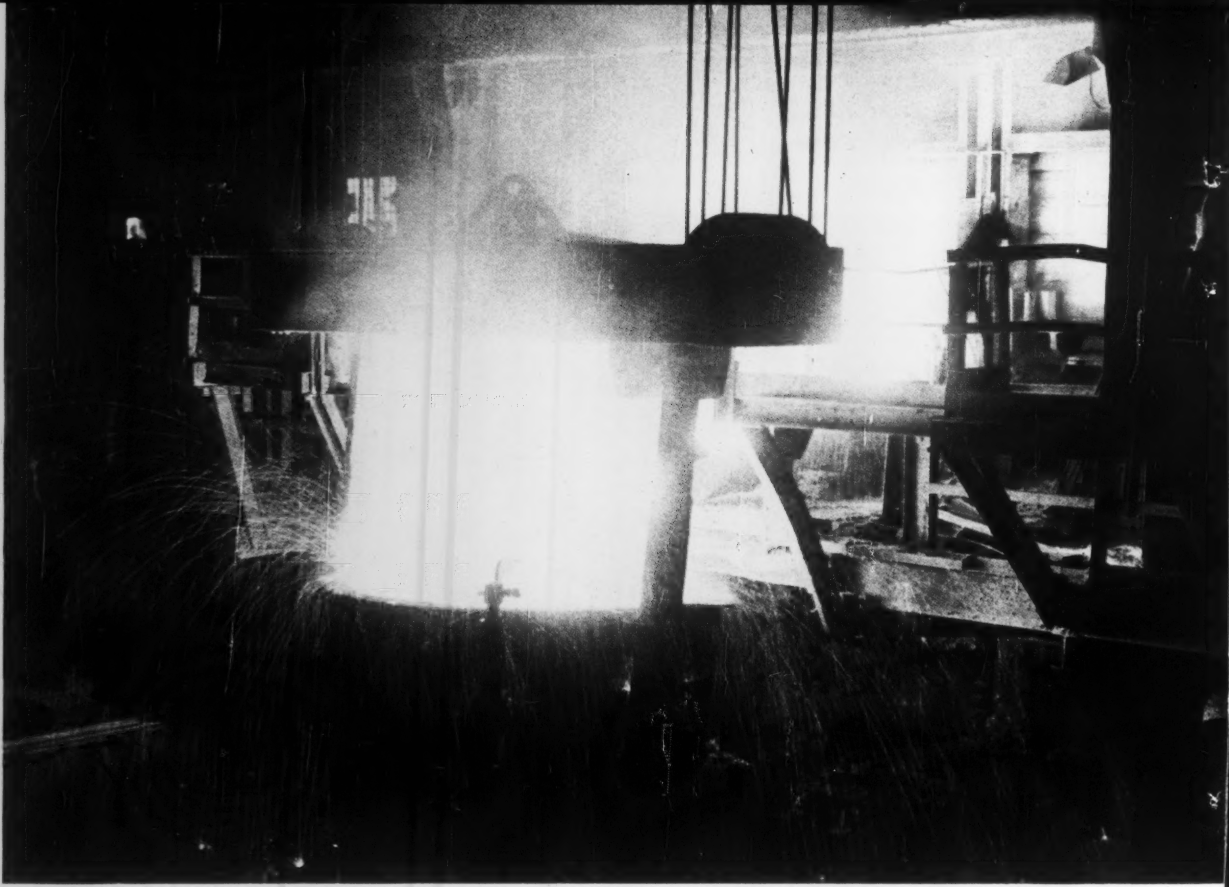
ALCO open die forgings for industry



ALCO



TO IMPROVE YOUR PRODUCT

ALCO steel, plus experience,

The forging plant of ALCO Products, Inc. at Latrobe, Pa. was built in 1888 to make steel tires for the large driving wheels of steam locomotives. Since that service is perhaps one of the most difficult to which a forging can be subjected, a tradition of quality workmanship began in the first years of the plant's operation. The tradition is even stronger today, with quality ALCO forgings going into the products of a wide range of American industry.

To augment this tradition of quality and to expand the sizes and types of forgings the Latrobe plant is capable of making, ALCO recently spent $4½ million there for new facilities. New furnaces, presses and machine tools were added. As a result, quality ALCO open die forgings in various shapes are now available in sizes ranging from 300 to 30,000 lb.

STEEL PRODUCTION: At Latrobe, ALCO makes its own steel in three open hearth furnaces and one electric furnace. The steel is exclusively for ALCO's use in forgings. It has benefits that are unique. ALCO steelmakers, knowing the importance of melting and special deoxidation techniques and exact steel chemistry for top-quality forgings, control each heat not merely within a specification range, but to an exact metallurgical specification. Thus ALCO forgings begin with steel that is specially designed for the intended application. Each heat contains artistries of steel production that have been perfected for their benefits to forgings. ALCO open-hearth operators average over 20 years' experience in steelmaking. ALCO steel can be specified to or within any AISI grade in carbon or alloy ranges. Special grades may be made on request.

OPEN HEARTH FURNACE OPERATIONS are supervised by men with long experience in ALCO melt shop. Heats are carefully controlled to exact specifications. ALCO's production of own steel and own ingot casting exclusively for forging operation assures top-quality end product.

ALCO'S LATROBE PLANT is completely integrated for forging production, includes open-hearth furnaces, an electric furnace, heating and heat-treating furnaces, forging presses, machining facilities and metallurgical labs. Begun in 1888, plant has long history of quality forging production, and its craftsmen and metallurgists lead the industry with developments like Hi-Qua-Led Steel®. ALCO recently spent $4½ million to expand plant facilities.

makes quality forgings . . .

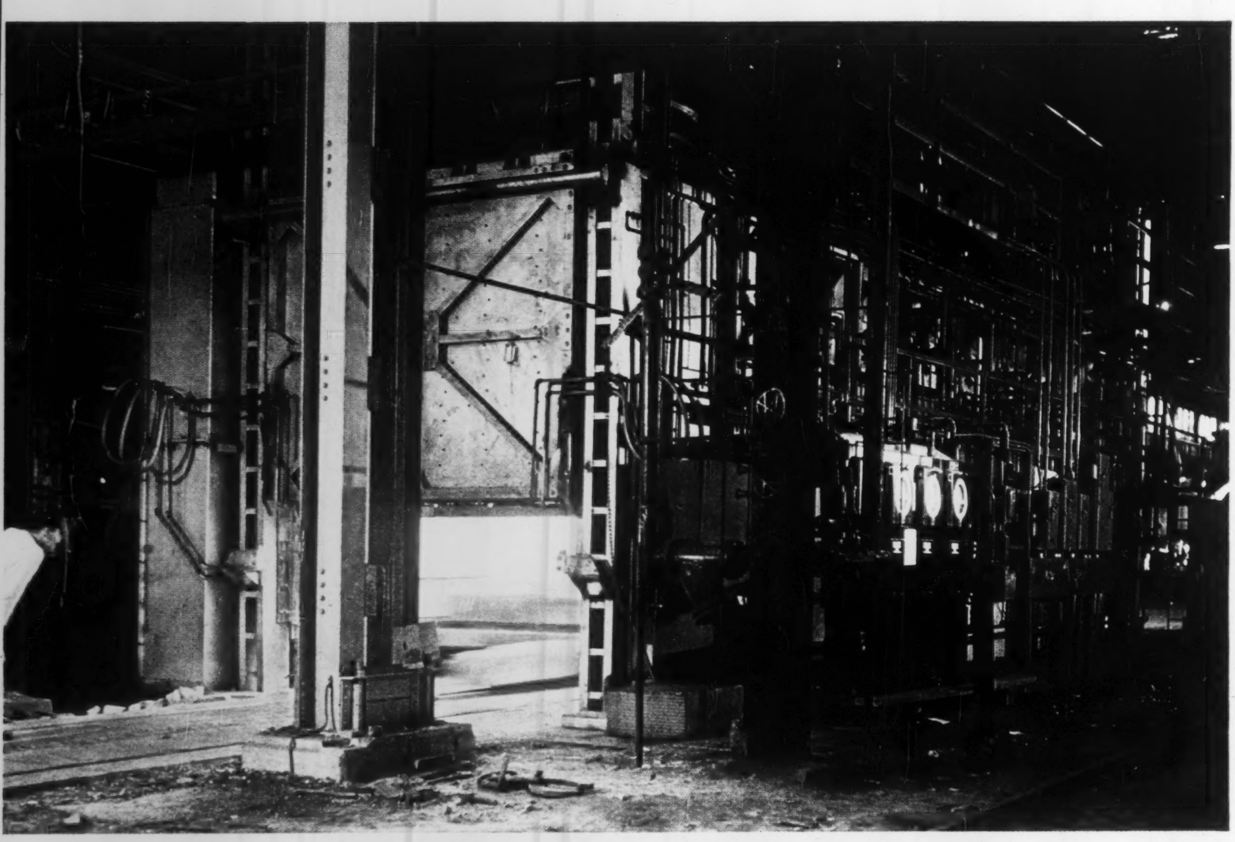
INGOT PRACTICES: Ingots made from ALCO steel range from 12 in. to 48 in. in diameter. Ingot casting for forgings is also an art, and ALCO takes all possible steps to insure ingots against imperfections that might affect the quality of the forgings.

Ingot sizes for various forgings are selected with care to provide for proper forging reduction to refine grain structure, and adequate ingot discards are planned to remove undesirable structures from the forging.

ALCO INGOT YARD contains extensive ingot stock in many sizes and grades. Ingots for open die forging are either carefully selected from yard, or, in the case of special specifications taken hot from the melt shop. Ingot practices provide for best forging reduction, adequate discard.

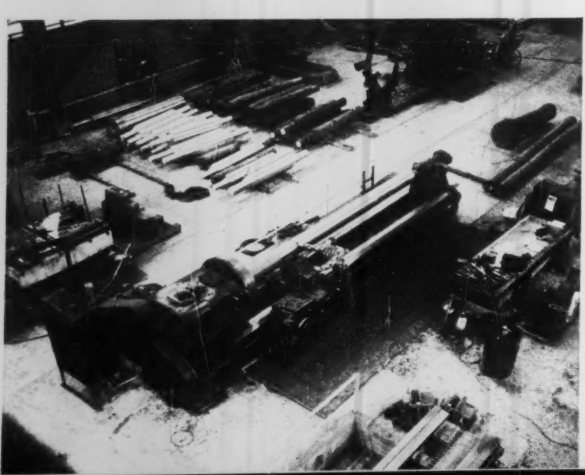
TO IMPROVE YOUR PRODUCT

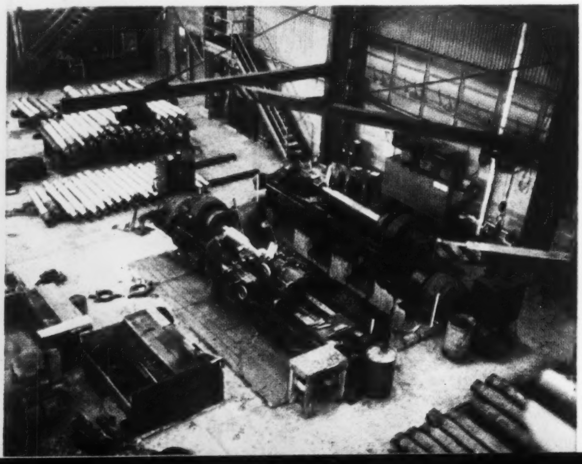
ALCO quality is maintained



ALCO CAR BOTTOM FURNACES have automatic control for temperature, atmosphere and pressure so that heat is constant throughout various furnace zones. Pit furnaces have similar controls. Ingots are brought to forging temperature in accordance with best metallurgical practice.

ALCO MACHINE SHOPS are well equipped to machine diversified open die forgings. Lathe (*left*) machines a shaft; lathes (*right*) machine forged axles. Machine shop also includes 45 ft lathes, planers, centering machines, horizontal boring mills and other related machine tools.





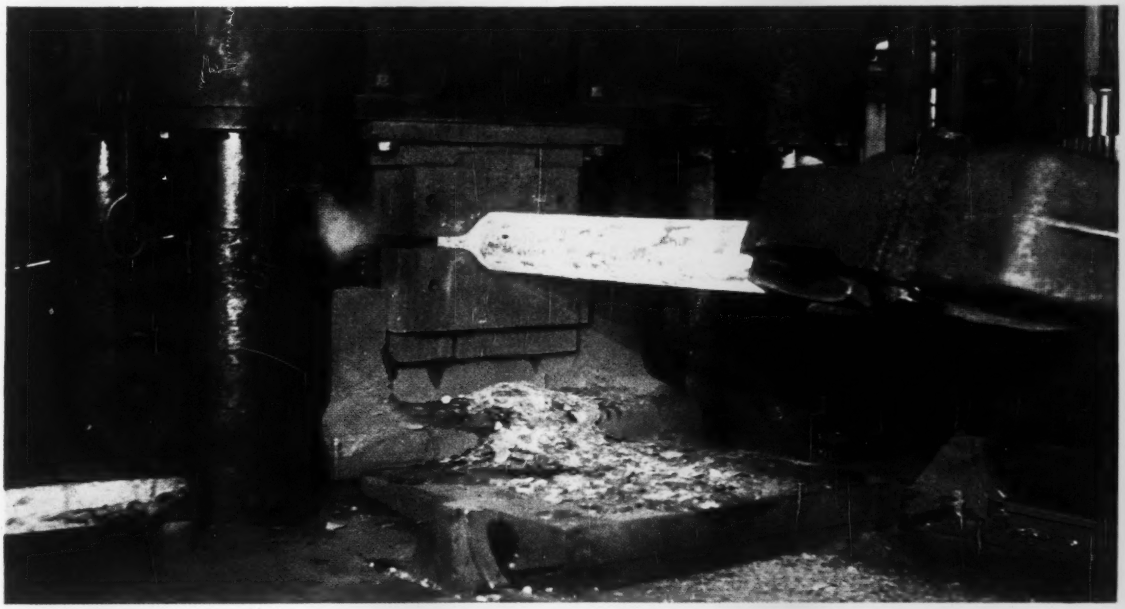
through forging and machining

ALCO open-die forgings are forged on steam and hydraulic presses ranging from 1000 to 5000 tons. Ingots are heated for forging in either car-bottom furnaces or pit furnaces. The furnaces are new and fully equipped with automatic controls to maintain uniform temperatures throughout. Ingots are heated to forging temperature according to well-recognized metallurgical practices.

MACHINING: ALCO, as part of the Latrobe plant expansion, has installed new equipment for machining open die forgings. It includes turning lathes capable of handling forgings up to 54 in. diameter and 45 ft long, centering machines, planers, horizontal boring mills and other related machine tools. These machines supplement an already large shop which has numerous boring mills, axle lathes and other tools.

HEAT TREATMENT: ALCO is prepared to give any open die forging the heat treatment necessary for satisfactory service. Below is a partial list of the heat-treatment procedures available.

NORMALIZE
ANNEAL (FULL ANNEAL, IN-PROCESS ANNEAL, SPHEROIDIZE ANNEAL)
NORMALIZE AND ANNEAL
NORMALIZE AND SPHEROIDIZE ANNEAL
NORMALIZE AND TEMPER
DOUBLE NORMALIZE AND TEMPER
NORMALIZE, QUENCH AND TEMPER
OIL QUENCH AND TEMPER
WATER QUENCH AND TEMPER
STRAIN RELIEF AFTER MACHINING



OPEN DIE FORGING PRESSES range from 1000 to 5000 tons. Proper forging reduction for grain refinement required, adequate discard after forging are keys to ALCO forging practice. Besides shafting, ALCO also produces mandrelled forgings, billets, blooms, slabs and special shapes.

TO IMPROVE YOUR PRODUCT

Tests prove quality of ALCO forgings

TENSILE TEST of 0.505 coupons is carried out by ALCO metallurgical lab. All testing is done on modern equipment by highly trained specialists. Coupons are carefully prepared to yield data that is standard.

ULTRASONIC TEST is made on forging. ALCO offers this test to customer specifications. It indicates soundness of forged piece by reflection of ultrasonic waves and supplements coupon tests.

ALCO conducts extensive tests on any forging it produces, and other tests can be made to customer specifications. First, of course, a sample of the steel from each heat is taken for chemical tests. Each forging can be planned with a test piece that is an integral part of the forging and is removed only after the forging is completed. Here are some of the tests ALCO can make from that piece:

MACROETCH
TENSION (ULTIMATE TENSILE STRENGTH,
  YIELD STRENGTH, ELONGATION,
  REDUCTION OF AREA)
BEND
HARDNESS (BRINELL, ROCKWELL, SHORE)
IMPACT (CHARPY AND IZOD)
FATIGUE
METALLOGRAPHIC (GRAIN SIZE, INCLUSIONS,
  MICROSTRUCTURE)
CREEP
CORROSION (STAINLESS STEELS)

Special tests, including magnetic particle test of forgings, may also be made to the customer's specifications. All test coupons are carefully shaped so that data will be standard. Each forging is identified so that a complete history of the forging and the tests made can be supplied.

MICROSTRUCTURE TEST indicates grain refinement of forged piece, is one of many tests that can be performed by ALCO. Each ALCO forging is identified so production, test history can be checked.

Forgings available from ALCO . . .

ALCO can supply open-die forgings, in the form of shafts, up to 45 ft long and from 300 to 30,000 lb in weight. ALCO can also supply forged blooms, billets and slabs up to 50,000 lb in weight, as well as mandrelled forgings to 84 in. diameter.

Any AISI carbon or alloy grade can be specified for any of these forgings, and any special grade can be made on request.

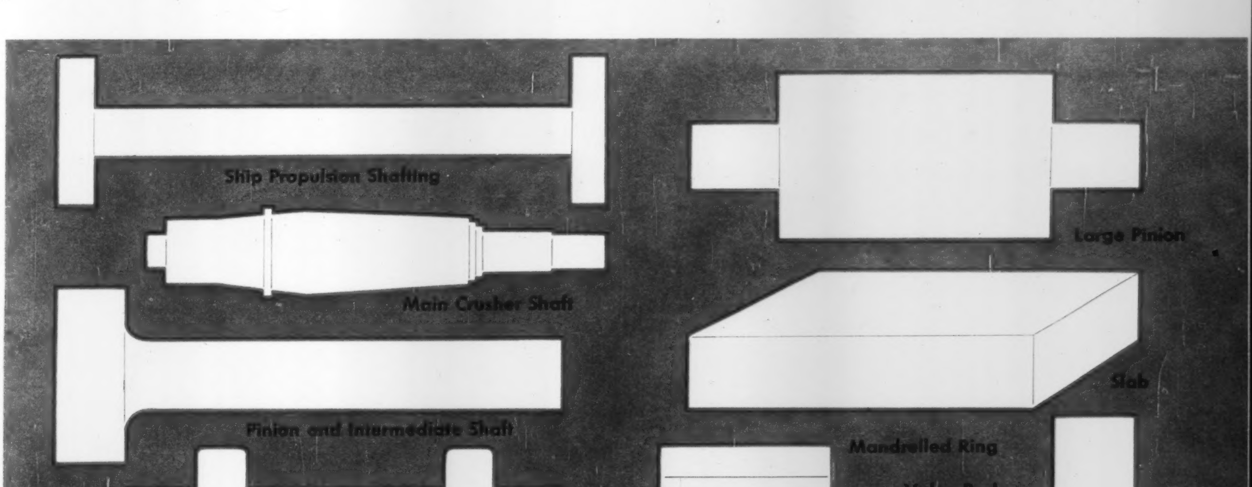
Below are some typical shapes of ALCO open die forgings.

Hi-Qua-Led Steel®

ALCO developed Hi-Qua-Led Steel as a way for customers to reduce machining costs. In ALCO's circular forgings Hi-Qua-Led Steel has found increasing acceptance. Extensive customer tests, as well as ALCO tests, show that tensile, impact, hardness and other mechanical properties are the same for the various grades of Hi-Qua-Led as they are for regular steel in the same grade, and that ALCO's method of lead addition eliminates lead inclusions or segregates.

Customers have reported very important savings – up to 50 per cent – in machining time and tool life through the use of Hi-Qua-Led Steel. If any forging requires more than four hours of machining time, it is quite possible that the use of Hi-Qua-Led will be profitable. ALCO offers Hi-Qua-Led Steel open die forgings in any AISI grade, and ALCO specialists will work with you to make sure that the use of Hi-Qua-Led is justified, and that you get full advantage of its machining properties.

Full information on Hi-Qua-Led Steel is contained in ALCO Bulletin SF-2.



ALCO SPECIALISTS in sales, engineering and metallurgy have many years of experience in forgings and are available to confer with you to determine the best product for your particular application. Contact the nearest ALCO sales office.

ALCO CIRCULAR FORGINGS, like ALCO open-die forgings, are quality product. Available from 18 to 145 in. OD, they can be obtained in Hi-Qua-Led Steel for impressive saving in machining costs. Ask for Bulletins SF-1 and SF-2.

For Further Information

write Spring & Forge Division,
Dept. SF-3, Box 1065, Schenectady, N. Y.
or contact the following:

ALCO Sales Offices

Atlanta, Ga.
488 Glenn Street, S.W. *JAckson 3-7811*

Chicago, Ill.
909 McCormick Building *WAbash 2-6234*

Cleveland, O.
Terminal Tower Building *CHerry 1-1953*

Houston, Texas
Room 444, Bank of Southwest Bldg. *CApital 2-9076*

Los Angeles, Cal.
6363 Corsair *RAymond 3-8741*

New York (8), N. Y.
30 Church Street *COrtland 7-8660*

Philadelphia, Pa.
Room 1036, 1617 Pennsylvania Blvd. *LOcust 4-5288*

Pittsburgh, Pa.
Cochran & Greentree Roads *LOcust 3-1400*

St. Louis (16), Mo.
4050 Bingham Avenue *FLanders 1-8810*

San Francisco, Cal.
235 Montgomery Street *DOuglas 2-7393*

Tulsa, Okla.
200-206 North Denver Street *LUther 4-5151*

Washington (6), D. C.
910 17th Street, N.W. *DIstrict 7-3544*

ALCO Agents

Buffalo, N. Y.
Gibney-Decot Corporation,
2017 Kensington Ave. *CIrcle 0800*

Des Moines (12), Iowa
Fred W. Lagerholm, 340 W. 43rd Street

St. Paul, Minn.
Paul D. Curtis,
635 Prior Ave., N., *MIdway 5-4744*

Montreal (16), P. Q., Can.
E. G. Macnutt,
1255 Laird Blvd. *REgent 9-2359*

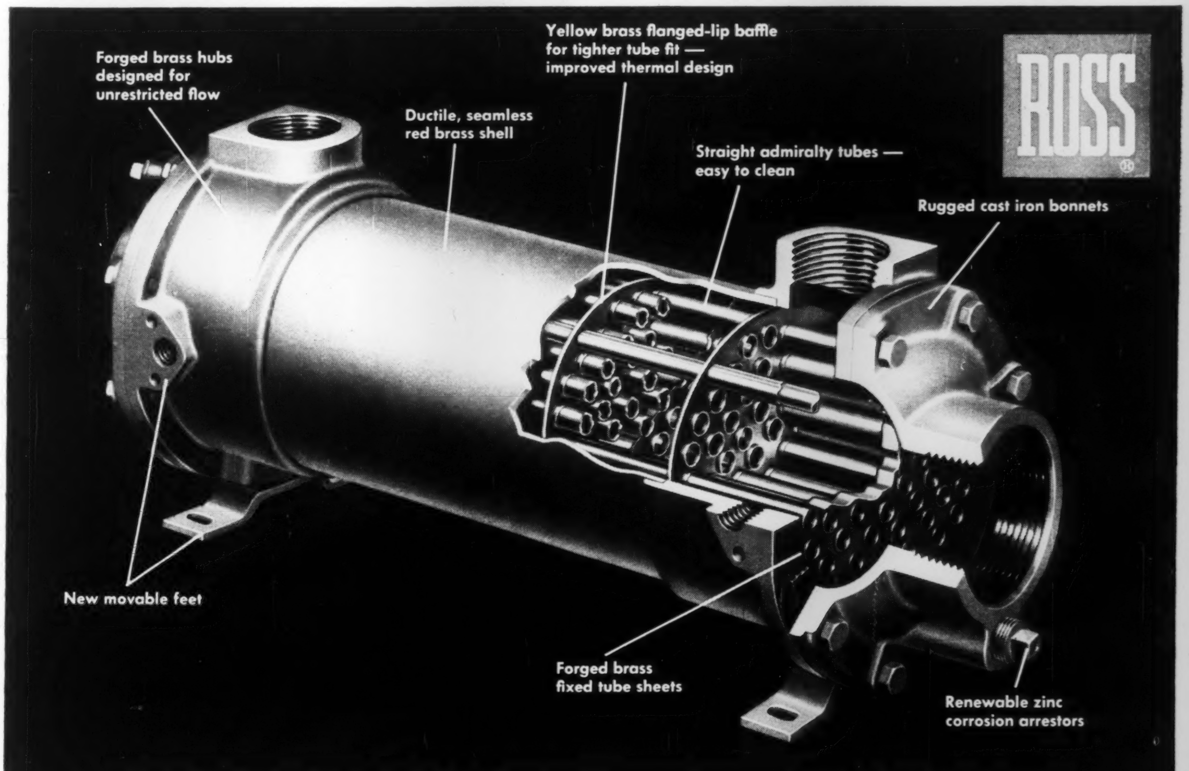
ALCO

ALCO PRODUCTS, INC.
NEW YORK

SF-3 11-57 A & MR

LOOK AT THE LEADER'S LATEST...

'58 design of a famous line . . . Ross BCF Exchangers


Forged brass hubs designed for unrestricted flow
Ductile, seamless red brass shell
Yellow brass flanged-lip baffle for tighter tube fit — improved thermal design
Straight admiralty tubes — easy to clean
ROSS
Rugged cast iron bonnets
New movable feet
Forged brass fixed tube sheets
Renewable zinc corrosion arrestors

Single Pass Design Cut Away to Show Details of Corrosion Resistant Copper Alloy Core Assembly

LOOK AT THE LIST . . . new design features, new sizes, new capacities, new mountings, new materials . . . *new low prices!* In 1958 the leader and originator of small, compact, fully standardized exchangers takes another step forward.

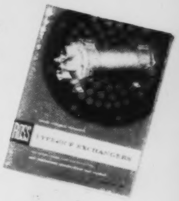
The Ross Heat Exchanger Division of American-Standard originated the whole BCF idea 14 years ago. Before then, pre-engineered design, mass produced parts and stocked assemblies were untried for a unit of this type. Designers and users of original equipment were quick to adopt the BCF as standard. Today, on a larger scale than ever, it is cooling lube oil, jacket water, hydraulic and other fluids for a wide variety of industries.

But, even with such success, the BCF has never been permitted to stand still. Ross has persisted in making constant design refinements and performance improvements . . . *1958 is typical: New* baffles with flanged lip at each tube hole and around outer edge for tighter fit and improved thermal characteristics. *New* stamped steel feet, movable in three positions around hubs for easy, more adaptable mounting. *New* sizes and capacities . . . 46 models . . . one, two or four pass designs . . . giving greater selection than ever before.

AMERICAN-Standard

ROSS HEAT EXCHANGER DIVISION

Look at the leader's latest. Send in the coupon below for the new Ross Bulletin . . . an up-to-date run down on the 1958 Ross Type BCF Exchanger.



Mail this coupon for new Ross Bulletin

To: **American-Standard,**
Ross Heat Exchanger Division
Buffalo 5, N. Y. S

Please send, without obligation, your new Bulletin 1.1K6 describing the 1958 Ross Type BCF Heat Exchanger.

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Republic Makes the Steels for Flight

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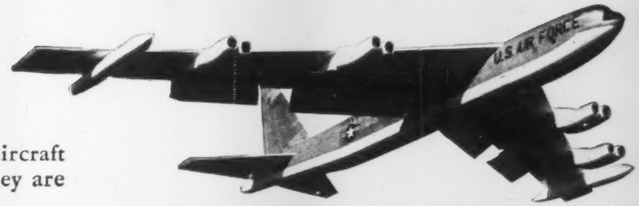
REPUBLIC STEEL

World's Widest Range of Standard Steels



TITANIUM IN THE BOEING B-52 saves 400 pounds in gross weight. Jet engine pods for this history-making, global bomber are fabricated by Bell Aircraft Corporation from titanium supplied by Republic and other producers. Titanium was selected for this application because of its lightness, strength, and corrosion-resistance. It offers the highest strength-to-weight ratio of construction metals. Titanium's extremely high corrosion-resistance makes it attractive for missile applications, such as fuel tanks. Nitric acid has little effect on titanium. It is immune to the corrosive action of salt water and sea air. Write for more facts.

Republic Steel is the world's largest producer of aircraft steels. And include guided missiles in aircraft. They are fast becoming a sizable steel consumer.

Steels furnished to the aircraft industry are as different as night and day. Requirements may individually call for strength, heat-resistance, corrosion-resistance, wear-resistance, high strength-to-weight ratio, ductility—or any combination of these factors.

One reason for Republic Steel's prominence in this field is that Republic *makes a wide variety of the steels required.* Another reason is its metallurgical service teams—field, mill and laboratory metallurgists with years of experience gained through helping hundreds of designers and manufacturers solve problems similar to yours.

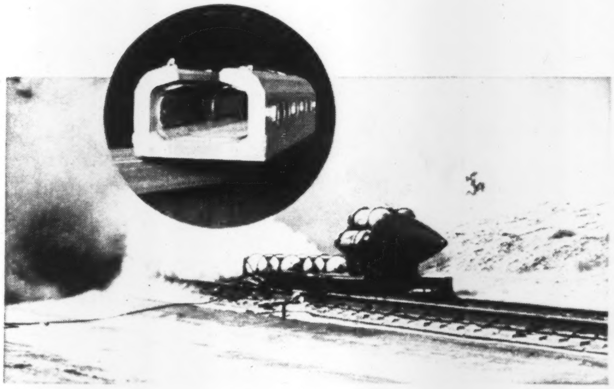
Now that the sound barrier has been passed and the next goal in sight is the "thermal thicket," material selection becomes even more important. To date two materials, titanium alloys and stainless steel, best qualify to meet high skin temperatures resulting from aerodynamic heat. Republic produces both of these metals in billets, hot rolled and cold finished bars, plates, sheets, and strip.

Republic Alloy Steels have played a prominent part in the development of operating and structural parts free from excess weight, yet tough and strong to withstand shock, impact, strain and vibration.

Our metallurgists and engineers are always available to work with your own personnel in using these Republic products to best advantage. The service is obligation-free and confidential. Send us the coupon if you would like metallurgical assistance.

U.S. AIR FORCE
FB-138
42138

ALLOY STEEL IN THE NORTH AMERICAN F-100 landing-gear struts provides strength, toughness, maximum resistance to fatigue. The struts are made by Bendix Product Division, Bendix Aviation Corporation. Exacting requirements for inner and outer cylinders resulted in the development of new grade of steel by Bendix and Republic metallurgists working in cooperation with North American engineers. This new steel, designated AMS 6427, was found ideal for application in the strength range of 220,000-240,000 psi. It maintains its great strength at wide temperature extremes. Republic metallurgists are available to help with your projects.



◀ **STAINLESS STEEL HELPS SPEED ROCKET SLED** to world's record of 1560 miles an hour. The sled, designed and built by Convair Division of General Dynamics Corporation, is used in supersonic tests to evaluate the effect of rain erosion on aircraft and missile parts. The sled rides rails on slippers made of SAE 4130 Alloy Steel. Within each slipper (see photo inset) are stainless steel inserts, Type 321, of which Republic is a supplier. The inserts serve as a lubricant to reduce friction by shucking off metal particles at a temperature of 1500°F. The stainless inserts reduce friction so effectively that engineers no longer take it into account in calculations of sled performance.

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Send more information on these Republic products:
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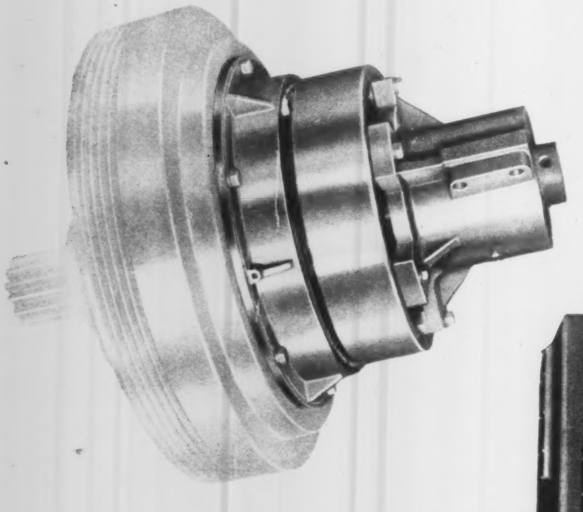
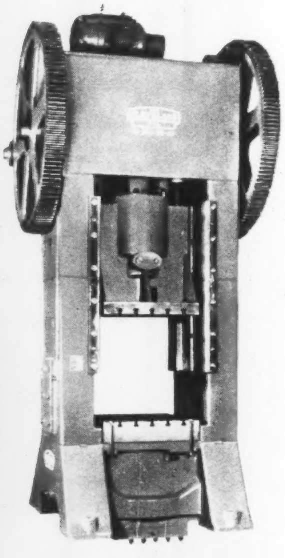
FOR ECONOMICAL OPERATION

CLEVELAND PRESSES

with patented Cleveland Drum Type Friction Clutch



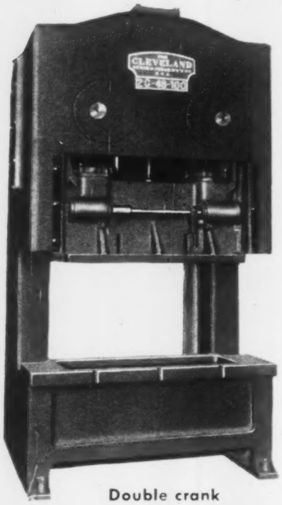


Straight-sided, single crank press

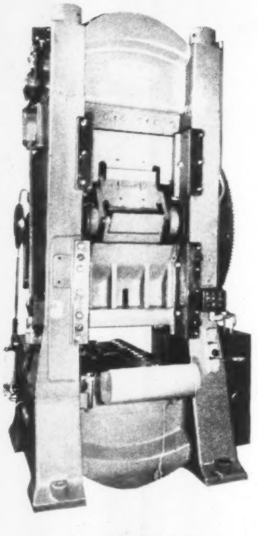
Investigate the opportunities for savings in production costs with any of Cleveland's eleven different types of presses equipped with the patented Cleveland Drum Type Friction Clutch.

Designed with a minimum number of parts, this patented Cleveland clutch weighs less, uses less power, is easily adjusted, can be readily serviced right on the press. It assures minimum down-time, lower operating costs, quicker starting and stopping to boost production.

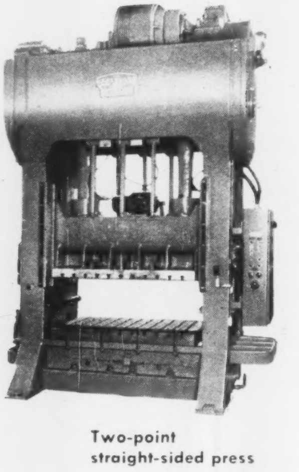
Get the facts on the production economy built into every Cleveland Press equipped with this Cleveland Drum Type Clutch. Write or call today!



Double crank open back gap press



Knuckle joint press



Two-point straight-sided press

THE CLEVELAND PUNCH & SHEAR WORKS CO.
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Established 1880

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THEY SMASHED INTO THAT WEIRKOTE® TILL WE COULDN'T STAND IT!

When a half-ton steel wrecking ball smashes broadside on target—mister, that's a *test*.

Yet, when Weirkote zinc-coated steel is put through that, or equally brutal punishment, the zinc remains an integral part of the steel.

Think of that demonstration in terms of *your* products, production steps and cost problems.

Weirkote, made by the continuous process, can be worked to the limits of the steel itself—spinning, deep drawing, roll forming, extrusion. And there's no flaking or peeling.

With Weirkote, you can eliminate the cost of plating, painting or re-dipping after fabrication. And now, Weirkote is treated to inhibit wet storage (white oxide) stain.

Free Weirkote Booklet

Send for the new booklet on Weirkote today. Write Weirton Steel Company, Dept. B-6, Weirton, West Virginia.

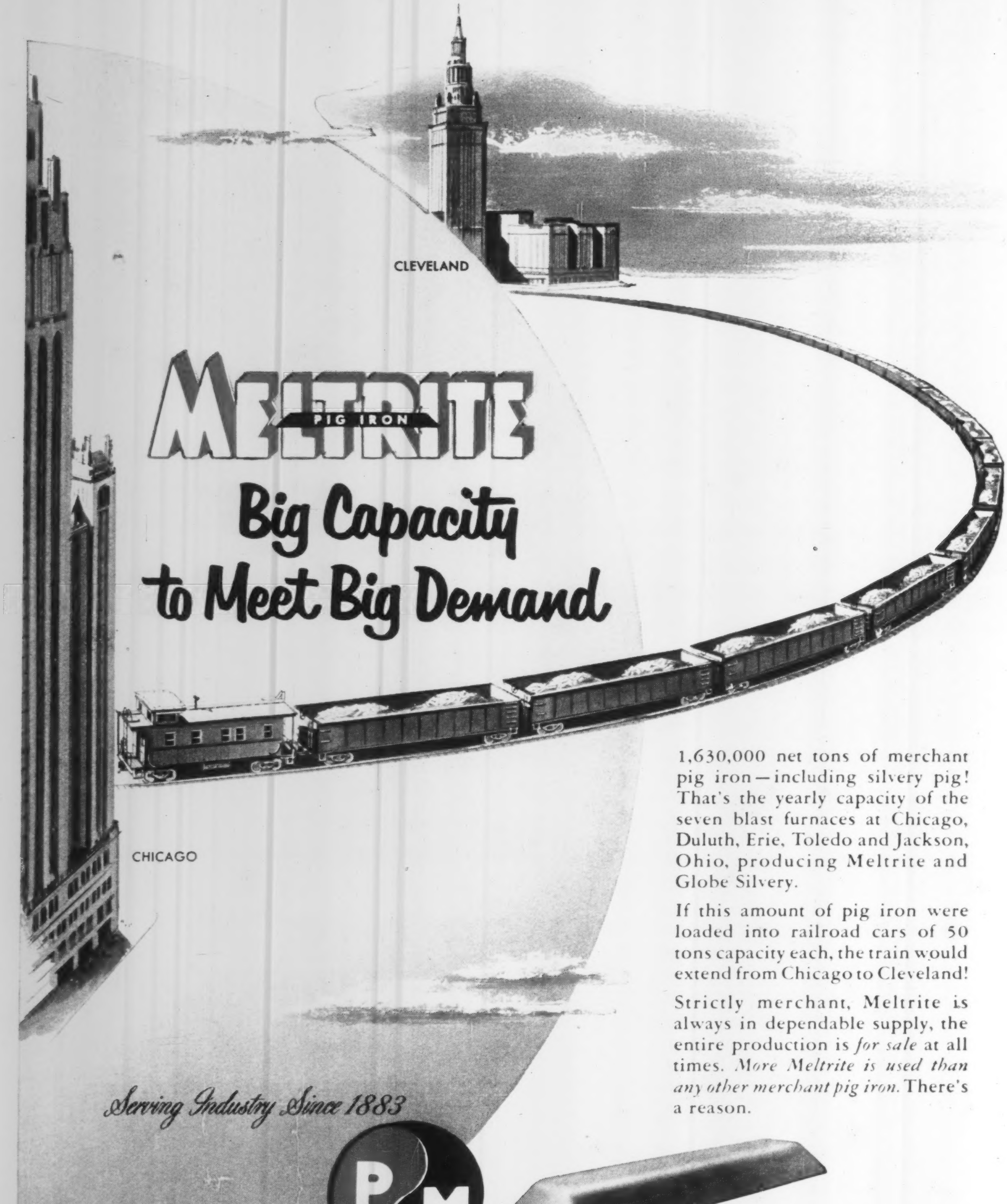
WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION


CLEVELAND
MELTRITE
PIG IRON
Big Capacity to Meet Big Demand
CHICAGO
Serving Industry Since 1883

1,630,000 net tons of merchant pig iron—including silvery pig! That's the yearly capacity of the seven blast furnaces at Chicago, Duluth, Erie, Toledo and Jackson, Ohio, producing Meltrite and Globe Silvery.

If this amount of pig iron were loaded into railroad cars of 50 tons capacity each, the train would extend from Chicago to Cleveland!

Strictly merchant, Meltrite is always in dependable supply, the entire production is *for sale* at all times. *More Meltrite is used than any other merchant pig iron.* There's a reason.

PM

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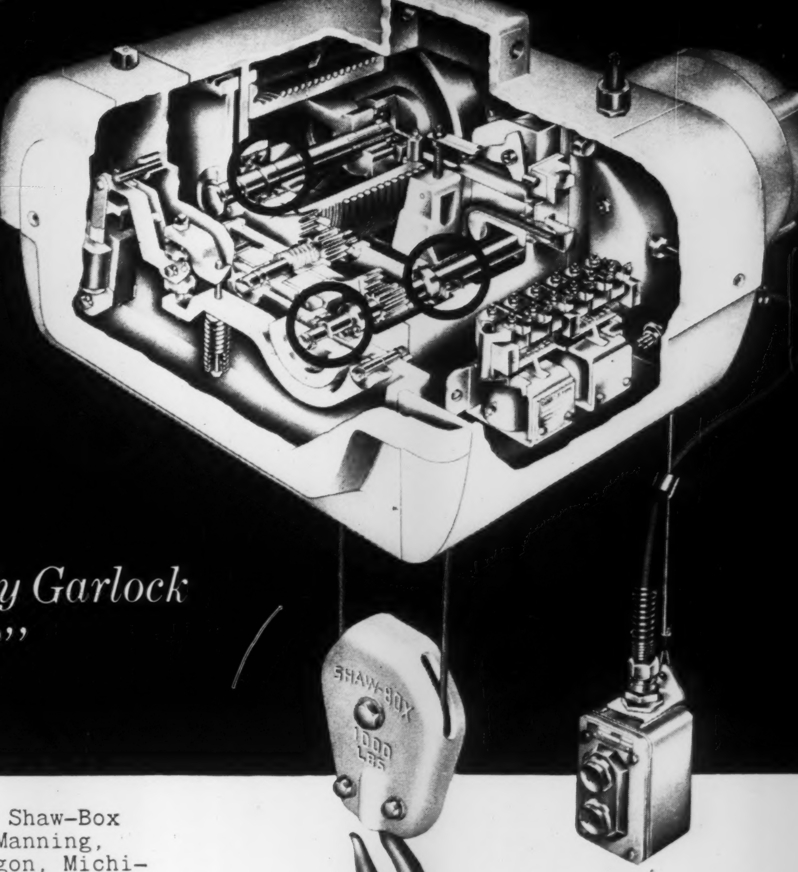
MORE OF THE GARLOCK 2,000

We Asked

MANNING, MAXWELL & MOORE:

"Why do you specify Garlock Klozure Oil Seals?"*



"Load-Lifter" Electric Hoist with 1000 pound capacity. Circles indicate position of Garlock Klozure Oil Seals.

For the past five years, the Shaw-Box Crane and Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Michigan, have specified Garlock Klozure Oil Seals for their "Load-Lifter" Electric Hoists. Recently, we surveyed the company to find what benefits they received by specifying Garlock.

Here is their reply:

"We use Klozure Oil Seals for three primary reasons.

1. dependability. Our hoist is designed for heavy duty use. A failure in any oil seal would shortly render the hoist inoperable. Therefore, we must use oil seals consistent with the quality built into the entire hoist.
2. long-life. The oil seal must permit easy maintenance and be reusable after hoist repair since replacement of oil seals during a minor overhaul is undesirable.
3. standardization. The fact that Garlock can meet nearly every oil seal requirement permits us to attain greater standardization of hoist components."

Cross section of Model 51 Garlock Klozure Oil Seal designed for medium-speed rotary service and low pressure reciprocating service. Two of these seals are used on the motor pinion shaft and a specially designed Klozure Oil Seal on the rope drum of the Electric Hoist illustrated above.

Garlock Klozure Oil Seals can serve your company equally well. Ask your Garlock representative for his recommendation from "the Garlock 2,000" . . . two thousand different styles of packings, gaskets and seals for every need. Or write for Klozure Catalog 20.

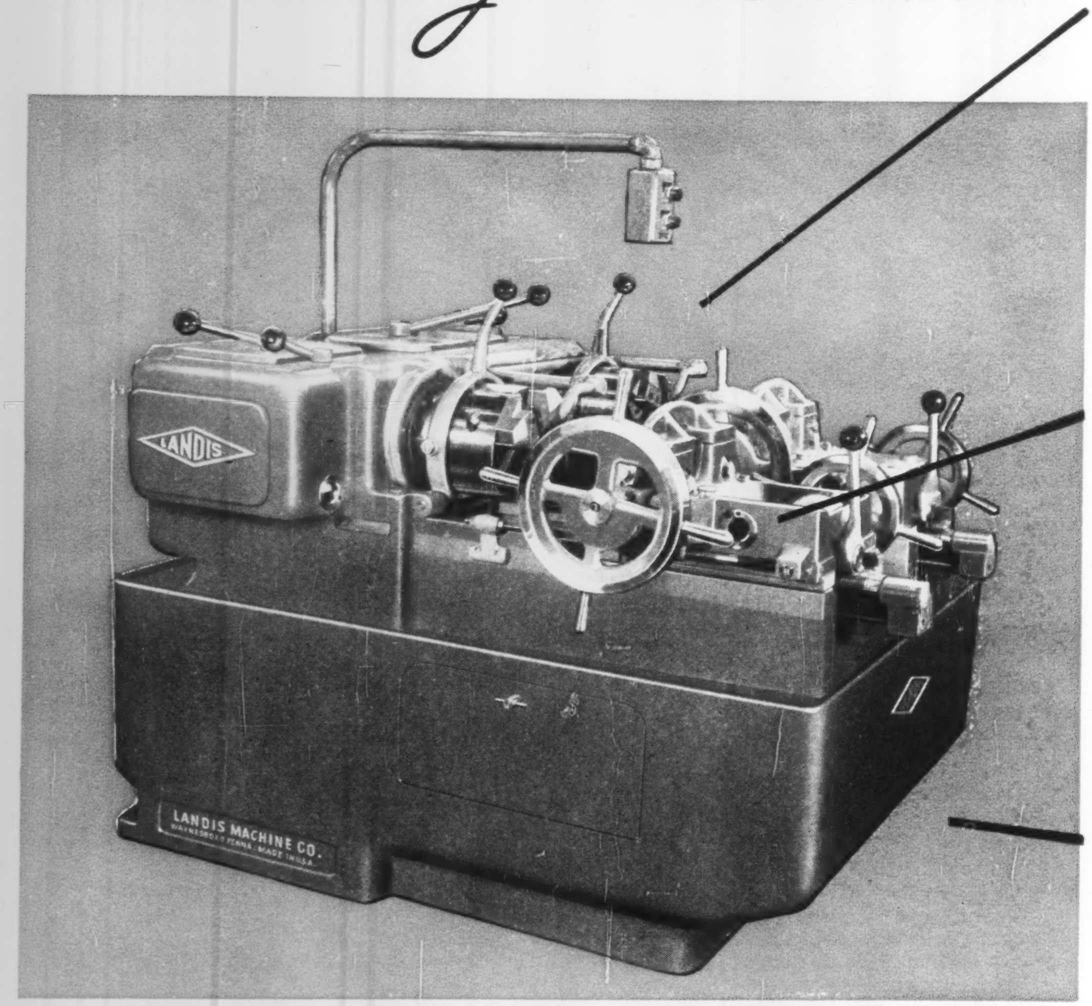
THE GARLOCK PACKING COMPANY, Palmyra, N.Y.
For prompt service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Molded and Extruded Rubber, Plastic Products

LANDMACO

threading machines

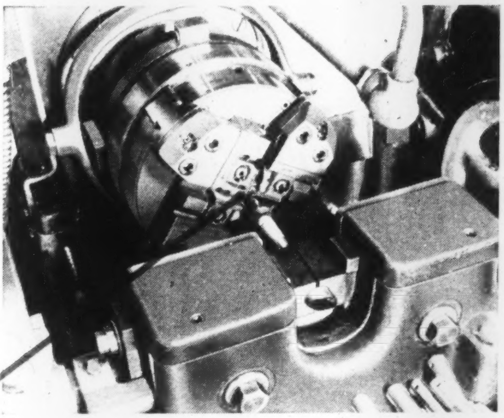


...... are built in a wide variety of models for commercial, heavy duty, and precision threading from 3/16" to 2½" in diameter.

Single or double-spindle models are available in varying bed lengths, with or without lead screw, using either of two die head styles, according to individual requirements. The die heads use LANDIS Tangential Chasers, which may be reground for 80% of their original length. Adaptation for oversize capacity and special jobs is easily made through auxiliary equipment.

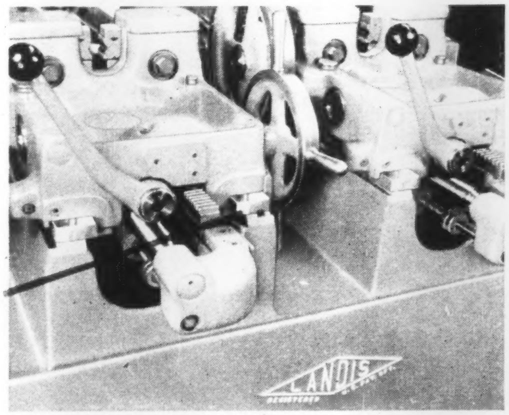
For more information, send specifications and ask for Bulletin H-76.

464C-2



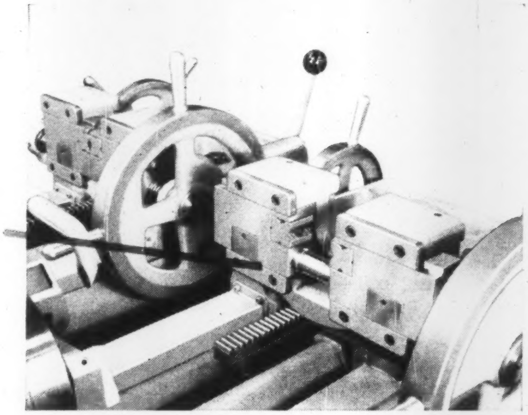
PRECISION

Hardened and Ground LANCO Die Heads combined with Lead Screw Feed enable threading to Class 4 and Class 7 tolerances. The fundamental design and specially selected and hardened materials of the die head provide the maximum rigidity required for this class work.



HEAVY-DUTY

Lead Screw Feed and rugged LANCO Heat Treated Die Heads enable the unusually heavy cuts required for producing Acme threads. Despite the heavy rate of metal removal, workpiece slippage is prevented by vise gripping power intensified by a "hammer blow" operating handwheel.



VERSATILITY

Each LANDMACO Threading Machine cuts a wide range of thread diameters—for example, the 12C LANDMACO has a standard threading range from $\frac{3}{8}$" to $1\frac{1}{2}$" in diameter, with oversize capacity to $3\frac{3}{4}$" for short thread lengths. Standard carriage vises enable the gripping of diameters larger than the machine's capacity, and special vises may be furnished. Tooling is available for Tapping, Turning, Grooving, Forming, and Facing operations.

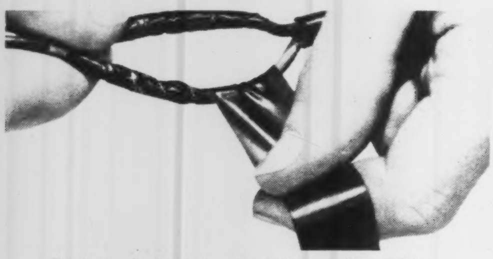
LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA

THE MODERN TOOL... AT WORK FOR MODERN INDUSTRY

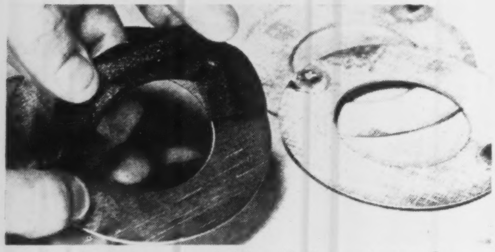
Polyken tapes-- experienced in solving a raft of problems

(maybe they can solve yours)

Paper-backed tapes ... masking, protecting, packaging.



Plastic-backed tapes ... insulating, sealing, splicing.



Cloth-backed tapes ... holding, binding, water-proofing.

Specialty tapes ... heat-sealing, bonding, reinforcing.

See the versatility of modern Polyken adhesive tapes. All have solved tough production problems . . . economically. For help with your problem, look in the yellow pages of your phone book for the Polyken Industrial Tape Distributor nearest you. Or write to the Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Illinois. Dept. S-1.

Polyken®

INDUSTRIAL TAPES

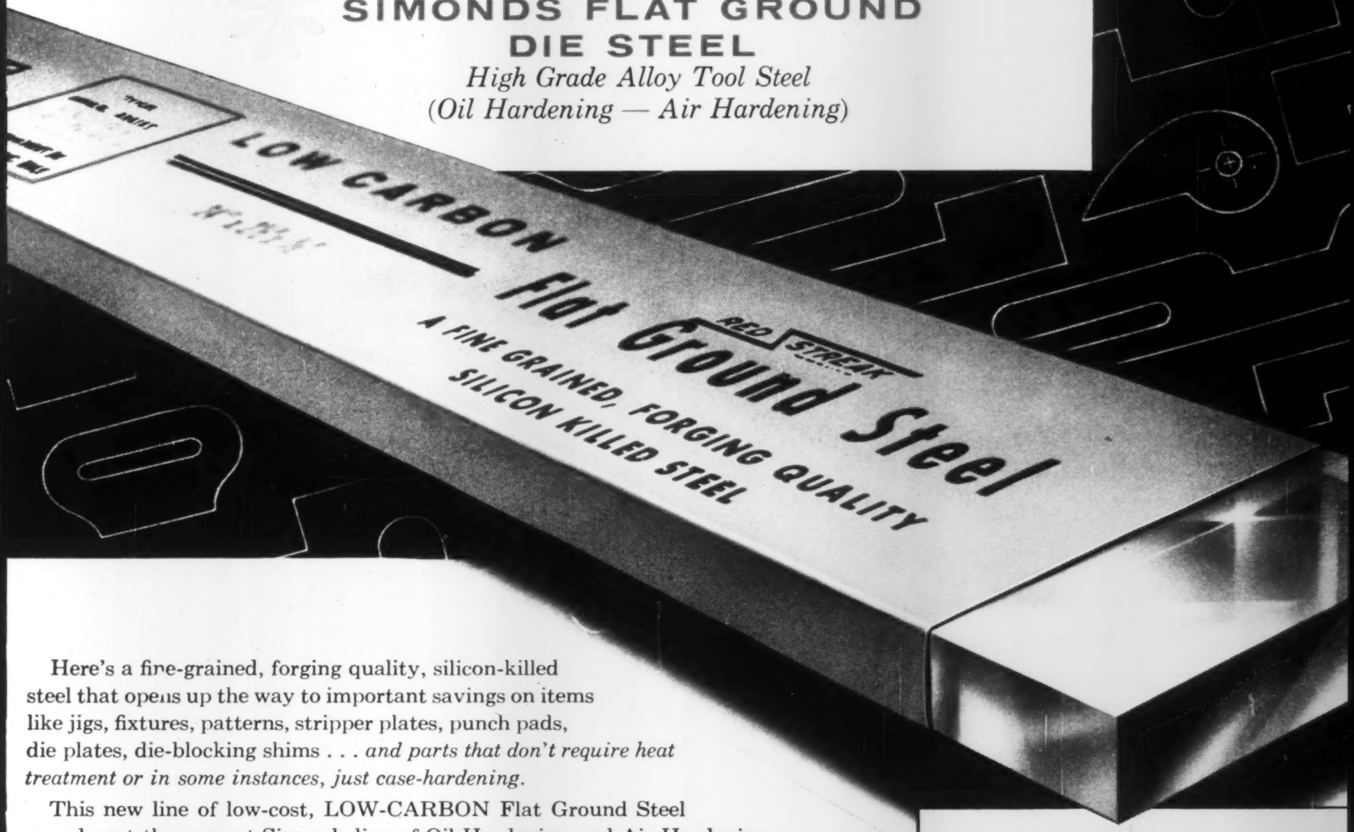
THE KENDALL COMPANY
Polyken Sales Division

Now SIMONDS Offers You
a Fine Grained, Silicon Killed

LOW CARBON
Flat Ground Steel

This new line is in ADDITION to

SIMONDS FLAT GROUND
DIE STEEL
High Grade Alloy Tool Steel
(Oil Hardening — Air Hardening)



Here's a fine-grained, forging quality, silicon-killed steel that opens up the way to important savings on items like jigs, fixtures, patterns, stripper plates, punch pads, die plates, die-blocking shims . . . *and parts that don't require heat treatment or in some instances, just case-hardening.*

This new line of low-cost, LOW-CARBON Flat Ground Steel rounds out the present Simonds line of Oil Hardening and Air Hardening Die Steel. What's more, it has equally fine finish . . . and is made to the same close tolerances, with excellent welding quality and machineability.

Simonds LOW-CARBON Flat Ground Steel is furnished in a wide range of flats from 1/16" to 1½" thick and ½" to 16" wide, and in squares from 3/8" to 2⅞". All sizes come in standard, ready-to-use 24" lengths, individually packaged. Stock sizes are ready now . . . special sizes on order. *Get full details from your Simonds Distributor today.*

TYPICAL CHEMICAL ANALYSIS

C. .18	Mn. .50
Si. .20	Phos. & Sul. .04

Heat Treatment By
Case Hardening Only

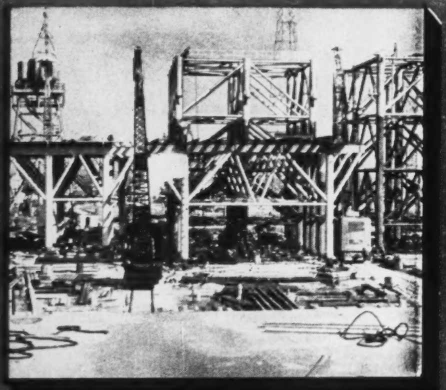
SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, Shreveport, La., San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio, Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

For Fast Service from Complete Stocks Call your **SIMONDS DISTRIBUTOR**

AVONDALE

a name you know for products of Steel



A mastery of steel . . . this is one of our most treasured accolades. We have learned the possibilities of this metal by experience. We have pioneered its uses in propellers, offshore drilling rigs, vessels of all description and more. Avondale is proud to offer to their customers the finest products of steel obtainable for the marine, oil, chemical and other fields. Our constantly expanding facilities for engineering, design and research are ready to serve you.

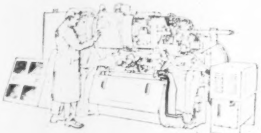
We are pleased to announce the formation of an Industrial Contracts Division. The function of this division will be to secure work of a varied industrial nature to fully utilize the diversified facilities of Avondale Industries.

SHIP BUILDING · SHIP REPAIRING · FOUNDERS · PROPELLERS · STRUCTURAL STEEL

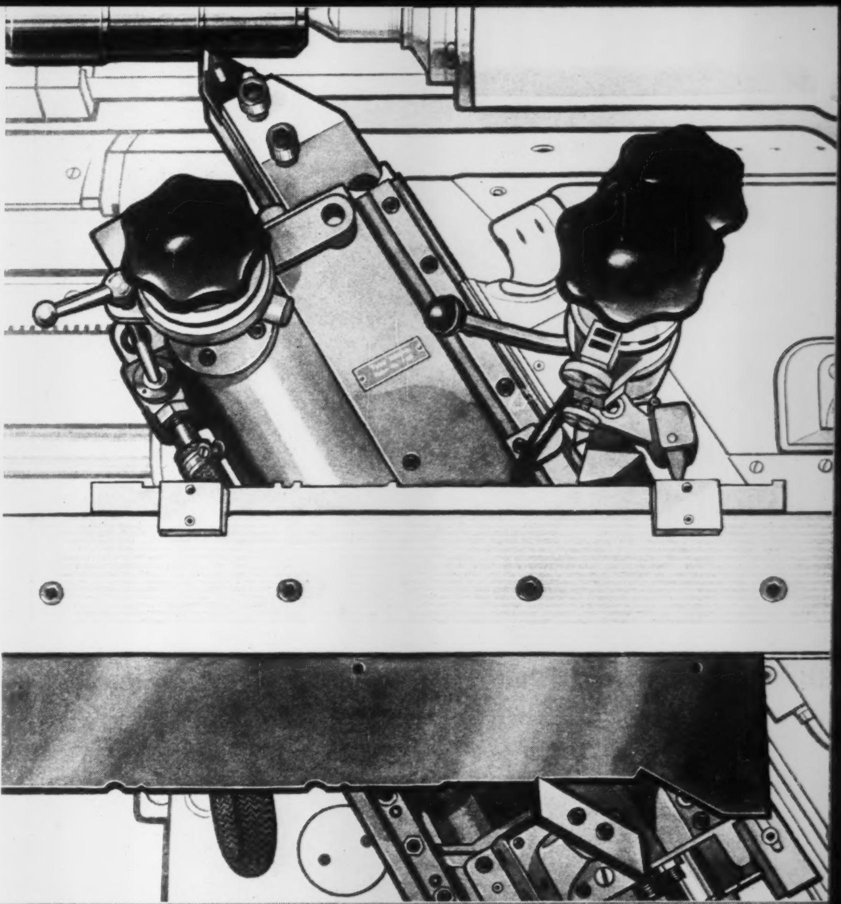
AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P. O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U. S. A.

Look at Single Point Tooling on New Britain +GF+

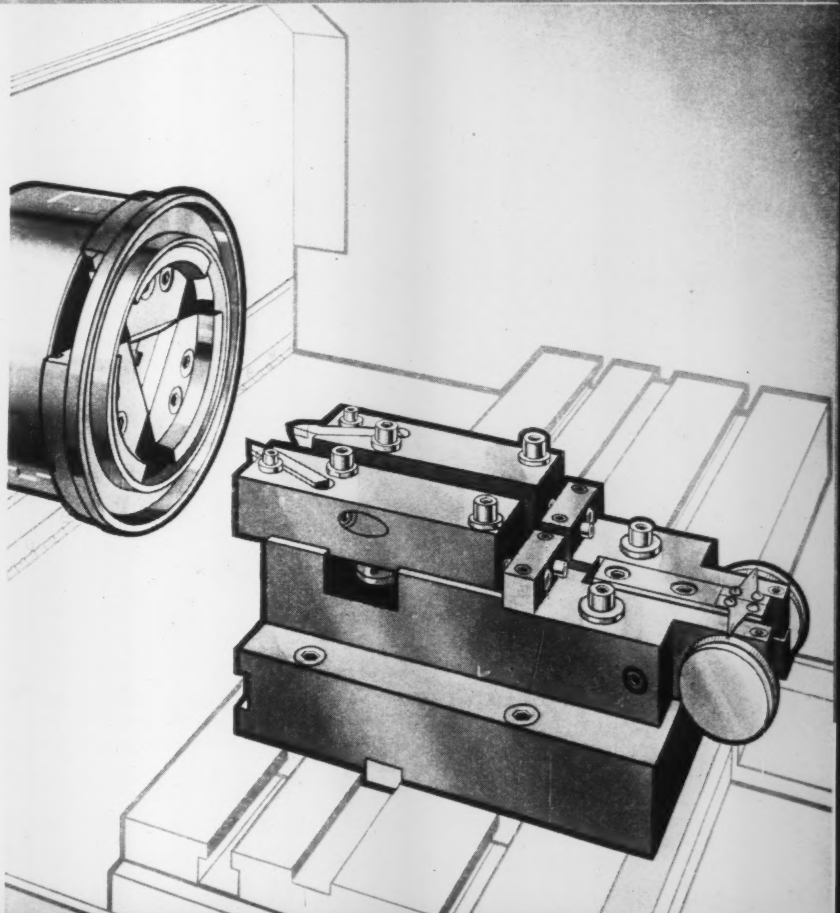


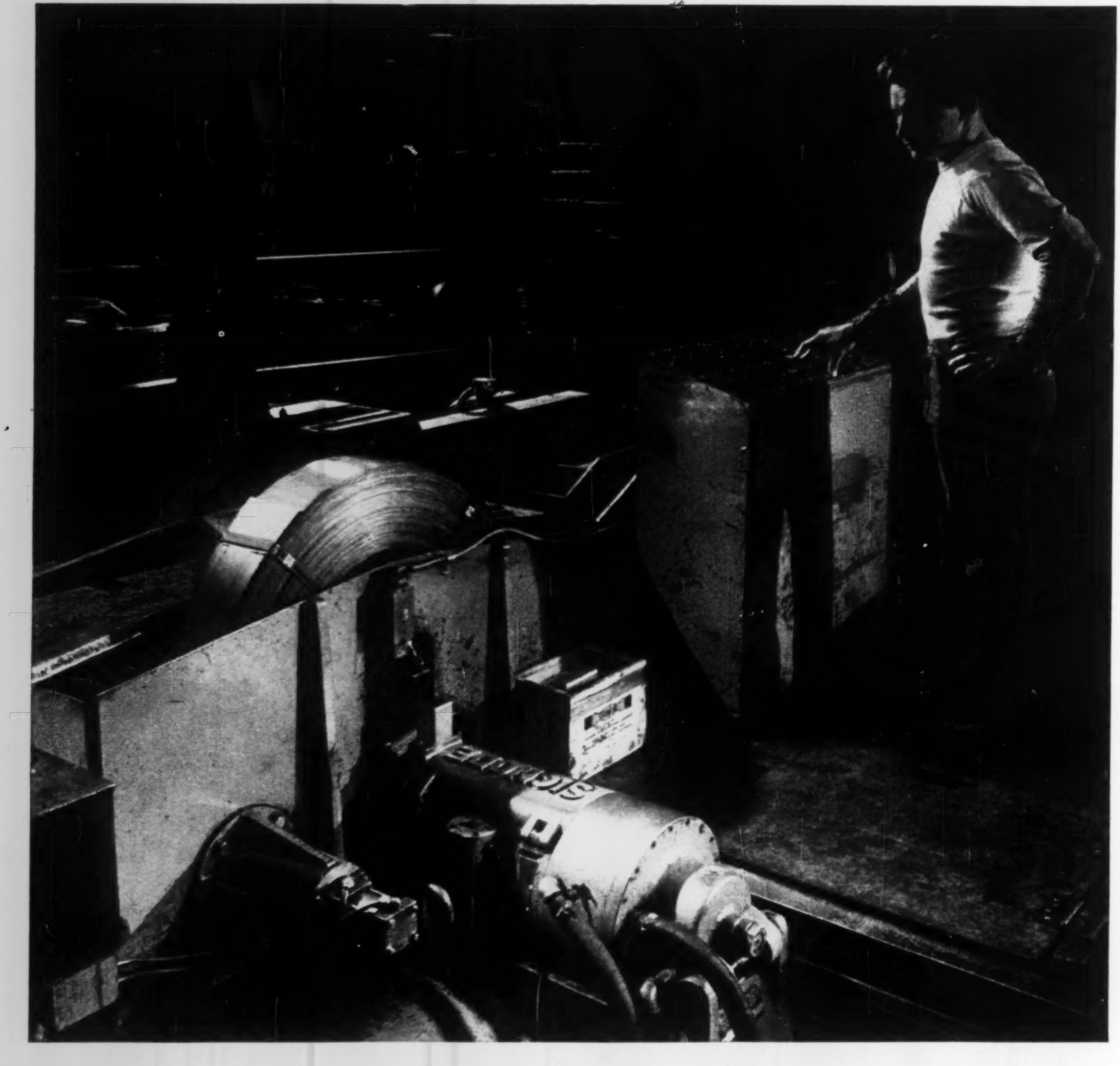
Outproduces gang tooling setups by reducing tool change time practically to zero, and by cutting at maximum speeds and feeds for tool efficiency.



Look at New Britain's simple approach to problem pieces

Low cost per piece is inherent in New Britain Precision Boring Machines because of their simplicity, versatility, speed, repetitive accuracy and inexpensive tooling. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.





They handle steel . . . with care

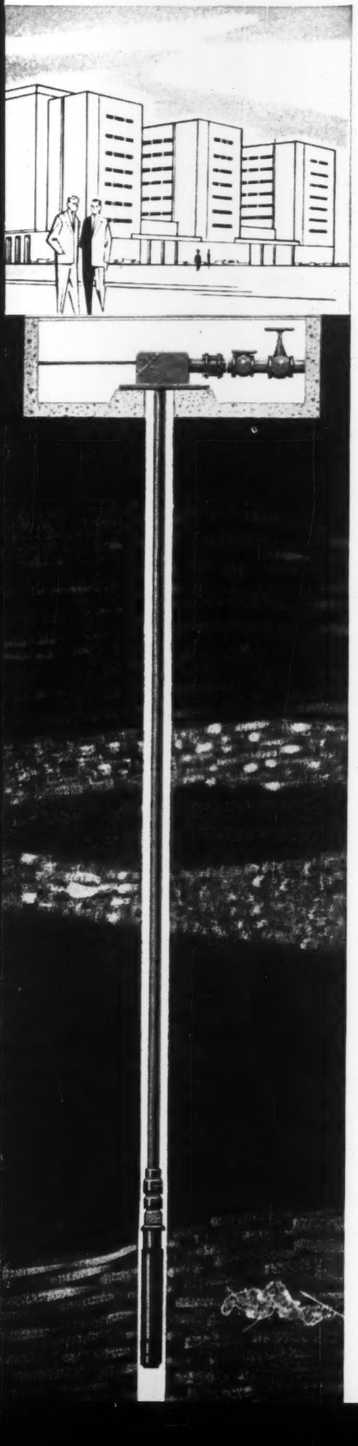
This man and Signode's Model MH10 power strapping machine are applying four steel straps to a coil of strip steel. The operator has fast push-button control of strap placement and the strapping action. To position the coil, the machine turns it in the direction that tightens the outer laps. Air-operated plates squeeze the sides of the coil to square it up. Surface finish of the steel is protected. Edges aren't damaged in handling or transit. There's no waste. The coil is worth more, whether it's yours as manufacturer or destined to be yours as receiver. Protection of product integrity to destination is one way Signode makes things cost less to handle, store, ship and receive. For more ways, call the Signode man near you, or write:

SIGNODE STEEL STRAPPING CO.

2645 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-Wide
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto

Now you can bury your pumping problems



FAIRBANKS-MORSE

Water-Lubricated Submersible Pump

Now you can have all the advantages of a submersible pump, plus time- and performance-tested Fairbanks-Morse features.

Fairbanks-Morse submersible pumps permit well location anywhere that a well can be drilled. No unsightly installations, no costly pump housing. Nothing—absolutely nothing—need show above ground. These pumps submerged in the well below water level are practically soundless and require no line shafts, packing boxes or lubrication devices. Hence, wearing parts needing maintenance are reduced to a minimum. A single moving assembly does all the work.

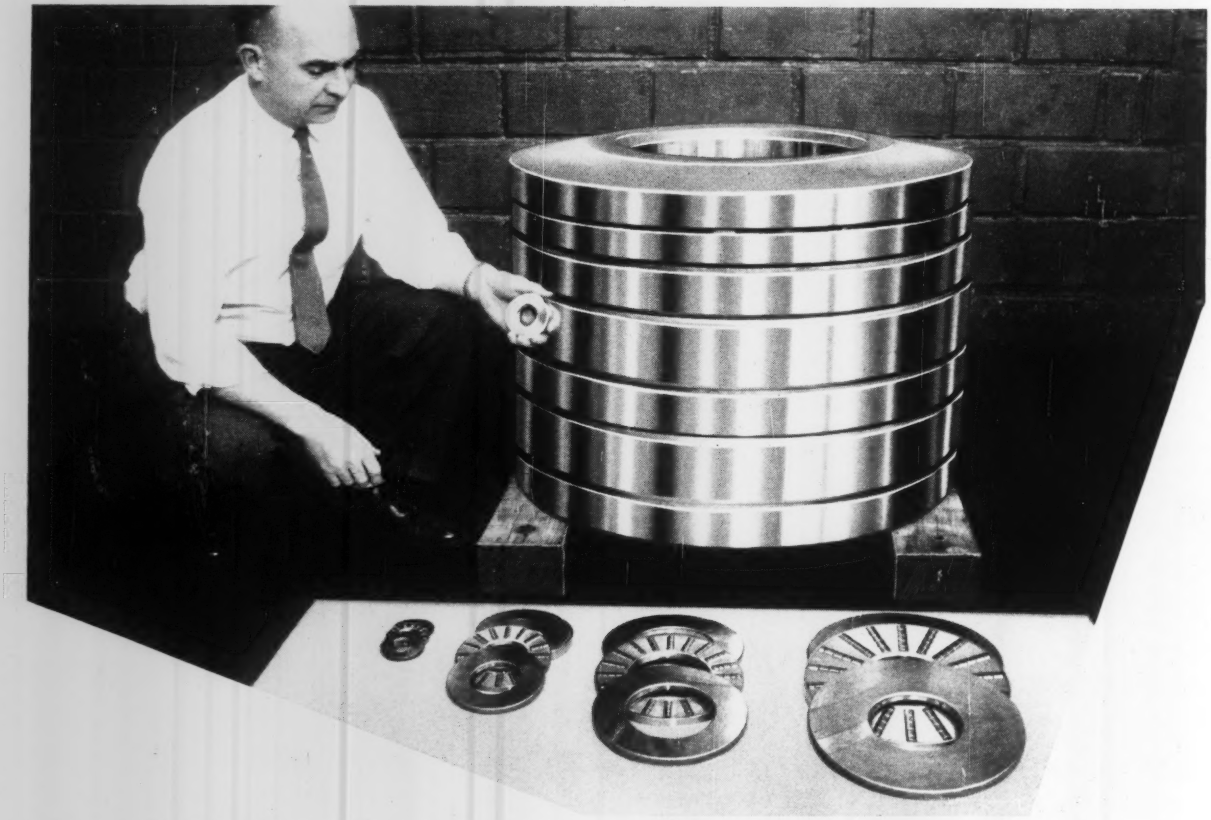
Installation is faster and more economical. The Fairbanks-Morse motor, with lifetime Copperspun rotor cooled by water and lubricated by water, gives full motor output. The well-known Fairbanks-Morse or Pomona pump bowls are combined with these wet stator motors to produce unbeatable pumping units covering a wide range of requirements as to volume, pressure, and setting depth.

For industry or community service you can place your water service trust in the F-M submersible. Contact your Fairbanks-Morse Sales Engineer and ask him for Bulletin 6910 on this time-proved submersible pump, or write today to Fairbanks, Morse & Co., Dept. S-1-6, 600 S. Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY
RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS



ROLLWAY THRUST BEARINGS . . .

→ $\int_{2''}^{36''}$ *Design + precision + quality that do the job in the one best way...*

Size in Rollway Thrust Bearings—big or little—is a mere matter of operating "geometry" and of the machinery to produce it. But design, precision and quality are dimensionless quantities that vary widely according to loads, speeds, temperatures . . . yet in the end sum up to a single constant: *"To do the job required in the one best way."*

Of course, we're proud of this 2¼ ton bearing with its thrust load capacity of 4,630,000 lb., its diameter of almost 3'-0" and its 3 roll assemblies with 6 precision thrust plates matched to equalize load and deflections for each stage. But we're equally proud of the little 2 incher in Design Engineer Grigson's hand. Despite the great difference in size, each has been carefully worked out *"to do the job required in the one best way."*

Whether you want a bearing for an oil rig, an extruder, a pulp mill jordan, a crane hook, a heavy duty lathe and countless other uses, Rollway has one that will do the job "in the one best way."

5 Standard Types:

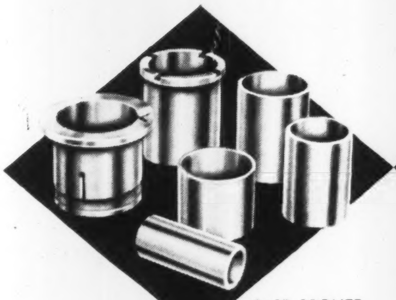
- Single aligning
- Double aligning
- Tandem
- Single acting
- Double acting
- Special-purpose types to your order

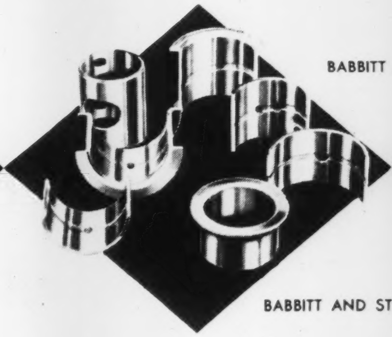
Our engineers will gladly consult with you regarding the standard or special-purpose types you need.

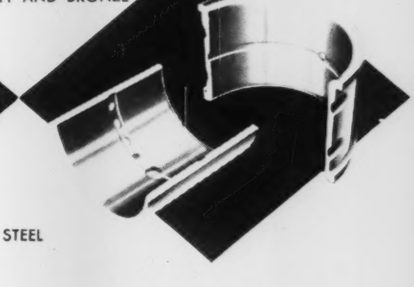
ROLLWAY®
BEARINGS

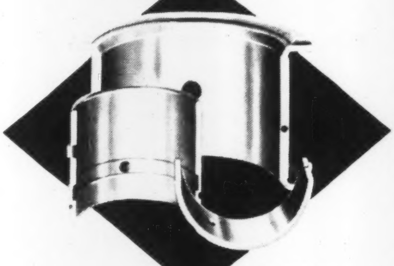
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

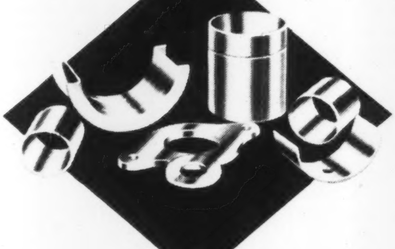
ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Milwaukee • Seattle • Houston • Philadelphia • Los Angeles • San Francisco


CAST BRONZE


BABBITT AND STEEL


BABBITT AND BRONZE

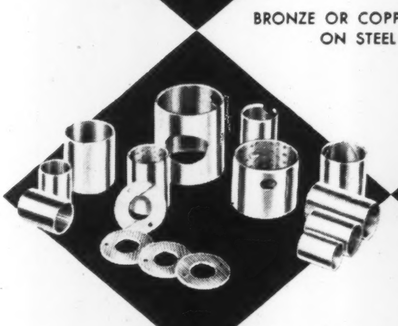

ALUMINUM ON STEEL

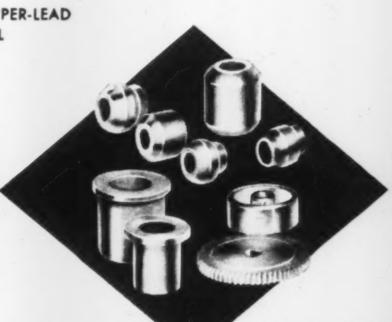

BRONZE OR COPPER-LEAD
ON STEEL

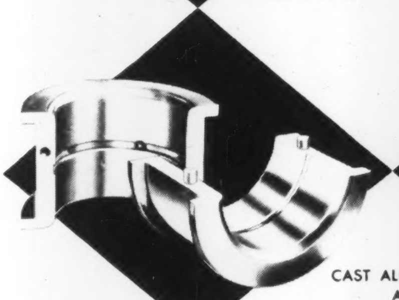
The correct sleeve bearing for your application

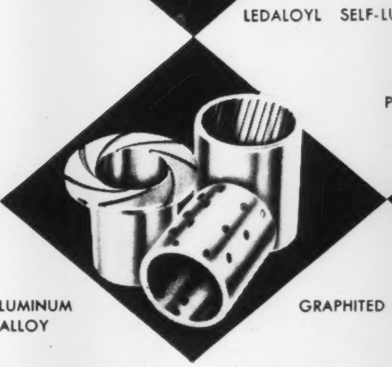
You can count on getting the correct sleeve bearing for each application, when you specify Johnson Bronze. Competent engineers and metallurgists, backed by more than 50 years exclusive bearing experience, are available to help you solve your bearing problems. They will recommend the most economical and efficient bearing for each application. All types of sleeve bearings, either standard stock sizes or made to specifications, are available without delay. To get the exact bearing you need at the most economical price, call, write, or wire Johnson Bronze Company, 550 South Mill Street, New Castle, Pennsylvania.

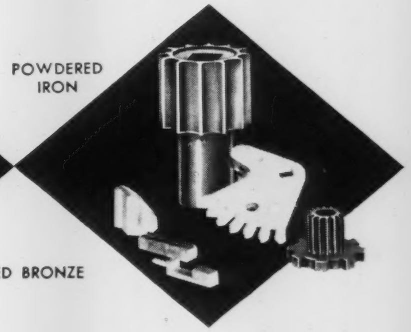
JOHNSON
Bearings

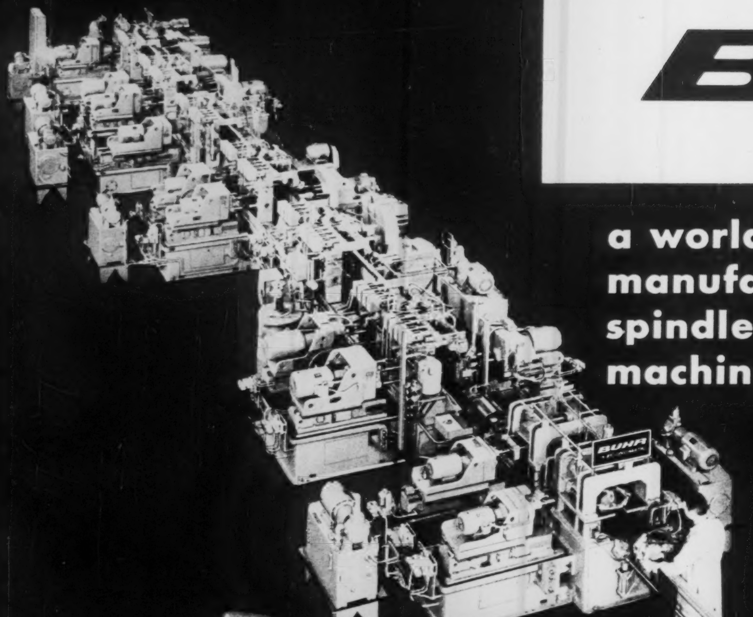

ROLLED BRONZE

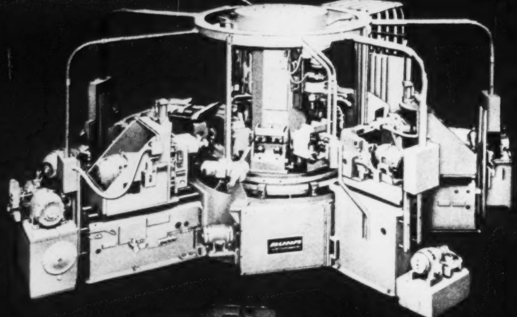

LEDALOYL SELF-LUBRICATING

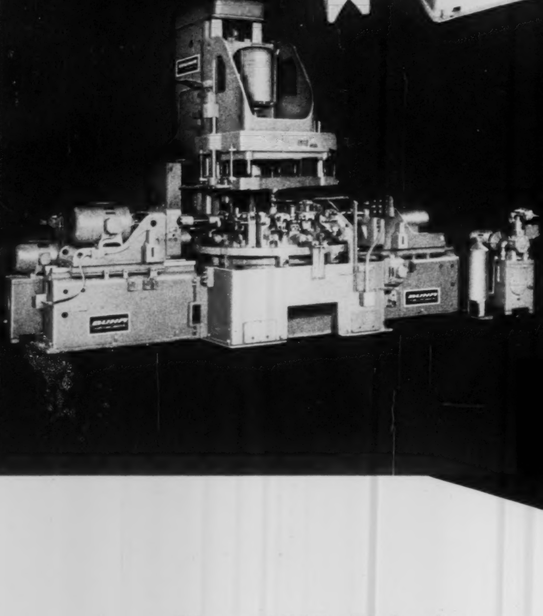

CAST ALUMINUM
ALLOY

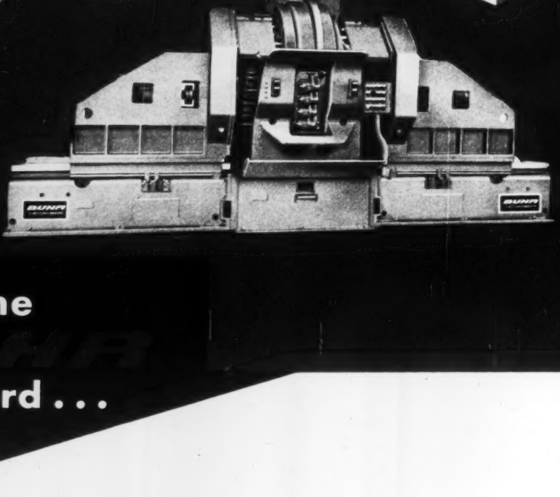

GRAPHITED BRONZE


POWDERED
IRON









BUHR

a world's leading manufacturer of multiple-spindle high production machinery like this...

the BUHR record...

Since 1912, Buhr has grown steadily to its present position as a world leader in the manufacture of special automation machinery.

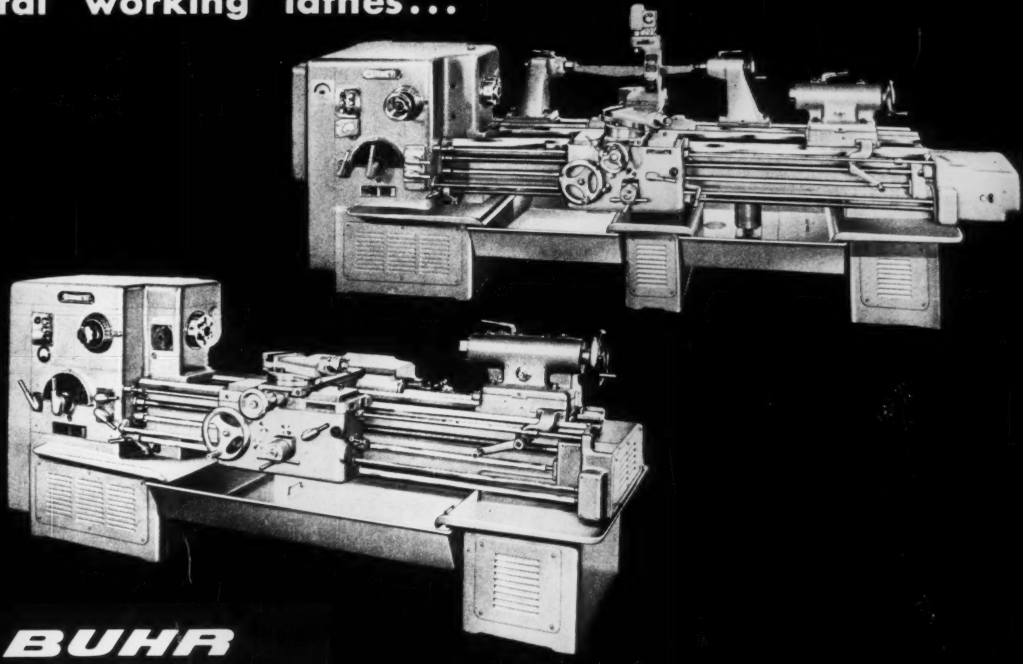
Wherever special metal-working machinery is purchased, BUHR ECONOMATICS are well-known for Quality and Performance.

BUHR MACHINE TOOL CO.
ANN ARBOR, MICHIGAN
Solidly Engineered • Precision Built • for World's Leading Manufacturers

BUHR
ECONOMATIC

ACQUIRES SIDNEY

assumes full control of producing one of the nation's finest lines of precision heavy-duty metal working lathes...



BUHR plans at SIDNEY...

1 **continue the present line** of Sidney engine and precision toolroom lathes, as well as the Sidney Fluid Tracer in the conventional- and universal-type.

2 **expand the Sidney line** to cover a wider range of sizes and applications.

3 **increase manufacturing facilities** to integrate production and assure better delivery.

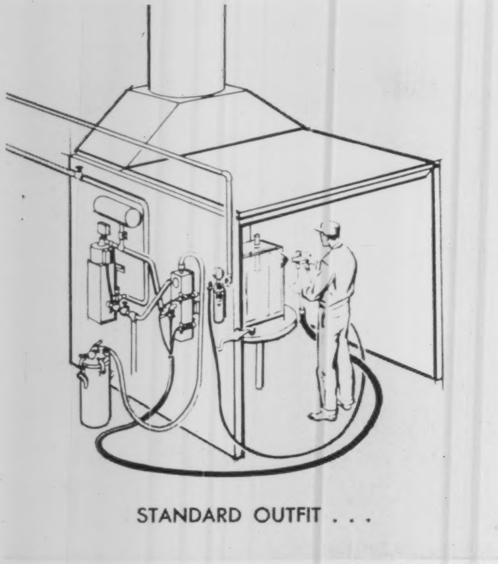
4 **merchandise Sidney Lathes** with the same aggressiveness which has characterized the selling efforts of the Buhr organization.

SIDNEY . . . a fine name in lathes . . . will be even FINER!

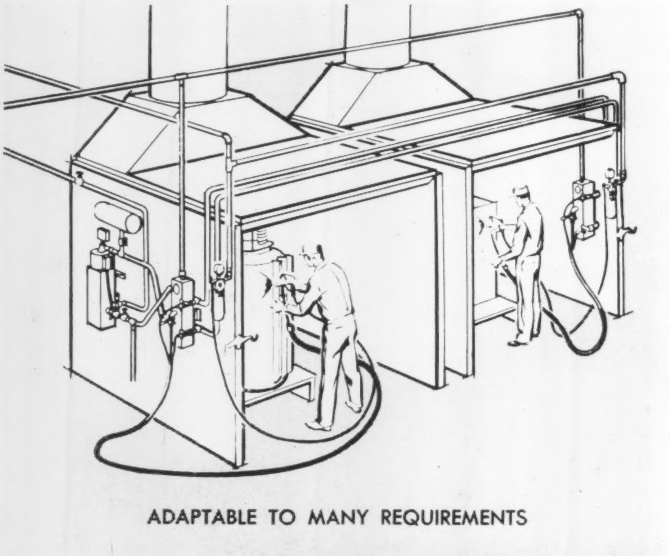
SIDNEY

SIDNEY MACHINE TOOL CO.
SIDNEY, OHIO
Wholly-Owned Subsidiary of Buhr Machine Tool Co.

How DeVilbiss Hot Spray cuts painting costs



STANDARD OUTFIT . . .



ADAPTABLE TO MANY REQUIREMENTS

Heavier film builds • Less overspray
Faster drying • Easier application
Fewer rejects
Better flow-out for high gloss

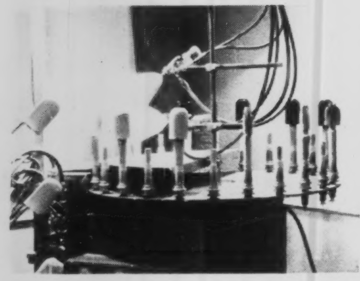
DEVILBISS
DV
ND
NEWCOMB-DETROIT

Using a DeVilbiss Paint Heater, you can get better coverage with *one* coat than you generally get with *two or more* cold-sprayed coats!

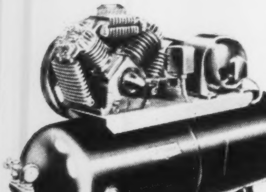
Here's why: Heat acts as a thinner to permit easier atomization and brings about new efficiency in spray painting. Even with your regular paint, heavier finishes can be applied with a savings of up to 50% in materials.

What's more, thinners are vaporized faster, drying time is decreased, finishes flow smoother and with less shrinkage. And the lower spraying pressure greatly reduces wasteful overspray.

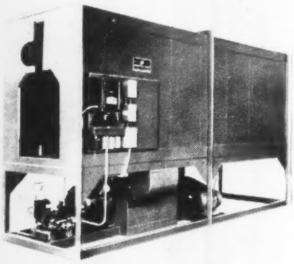
Call our nearest branch today, or write for free booklet, "New Efficiency from Hot Spray." The DeVilbiss Company, Toledo 1, Ohio.



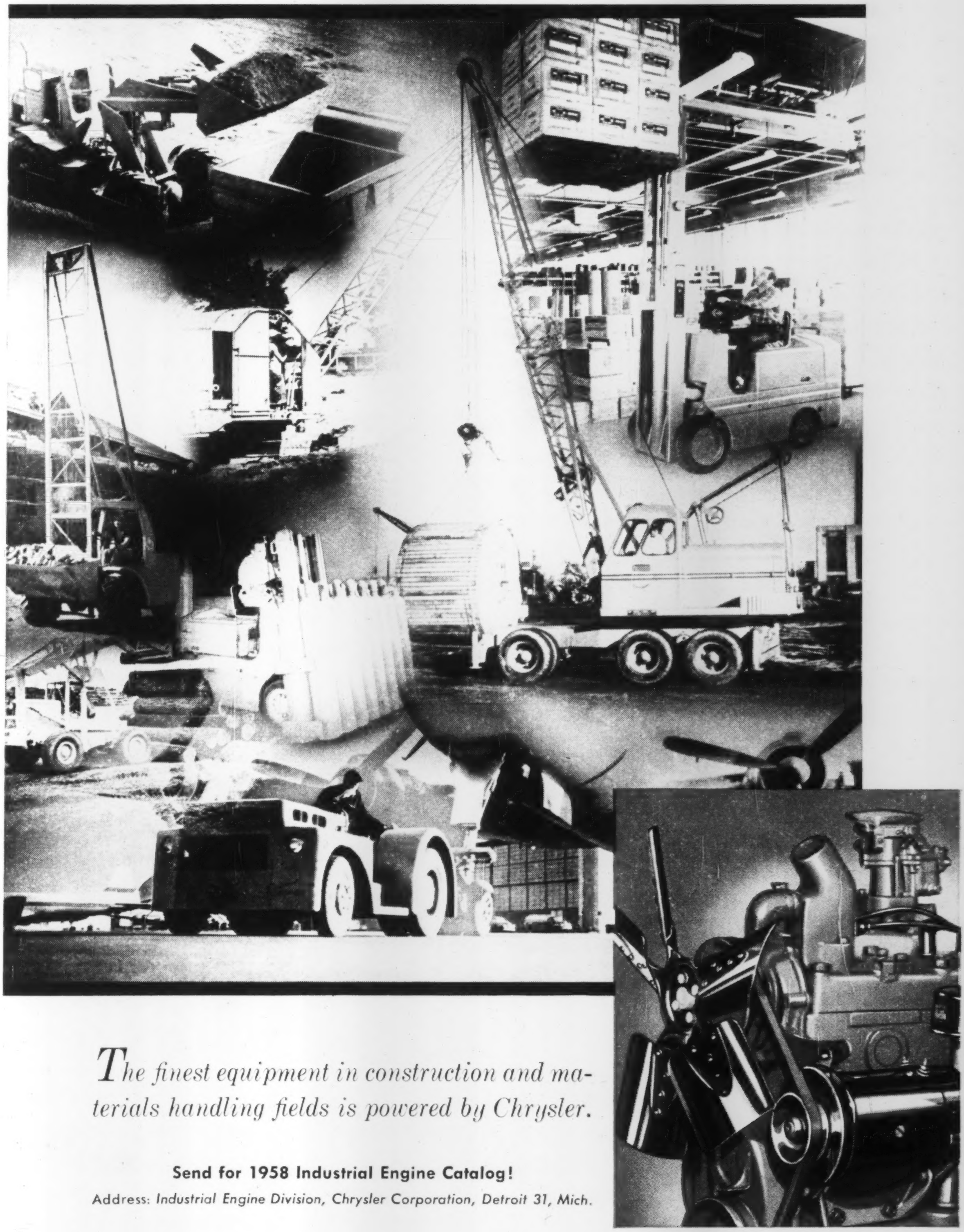
DeVilbiss Automatic Spray Machines coat products of any size or shape quickly, economically, automatically.
Send for Series I-8000 Bulletins



DeVilbiss Air Compressors deliver as much as 22.6% more air per power dollar. Sizes range from ½ to 15 hp.
Send for Catalog C-50



Newcomb-Detroit Ovens are designed and manufactured to meet layout and process needs for baking or drying.
Send for Oven Catalog



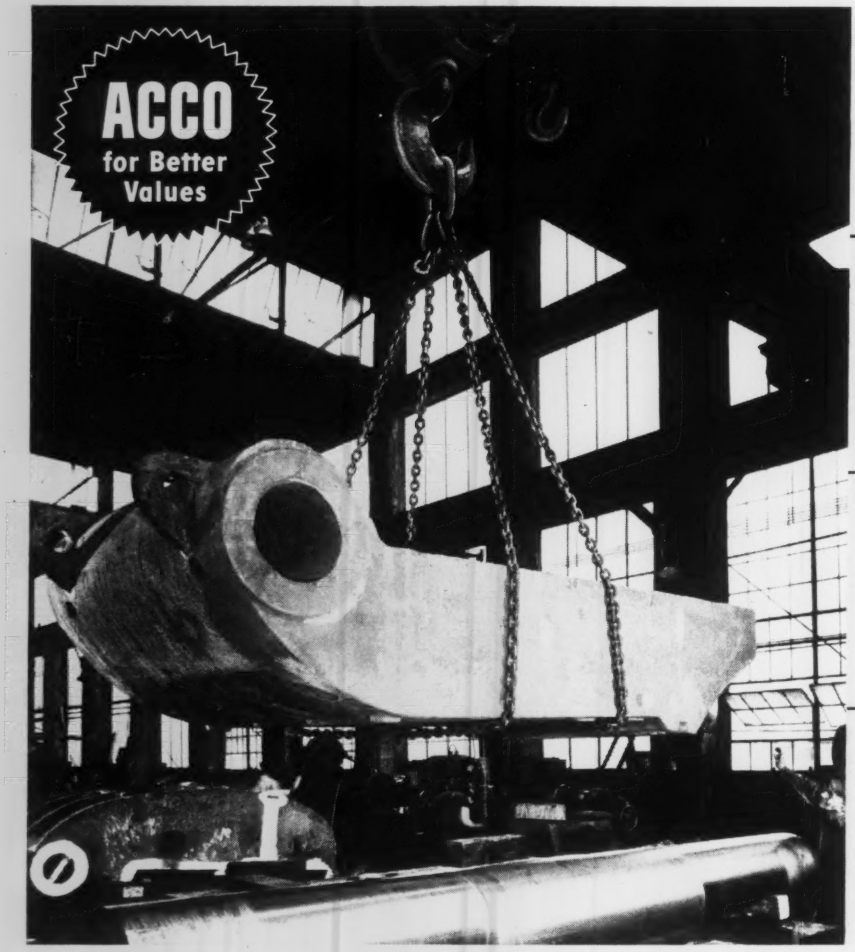
The finest equipment in construction and materials handling fields is powered by Chrysler.

Send for 1958 Industrial Engine Catalog!

Address: *Industrial Engine Division, Chrysler Corporation, Detroit 31, Mich.*

Chrysler INDUSTRIAL ENGINES

INDUSTRIAL ENGINE DIVISION • CHRYSLER CORPORATION



Accoloy X-weld 125 Chain
Pat. No. 2763768

New Shaped Master Link

REGISTERED SLING CHAIN
ACCO
-125
ACCO Registration Ring

Registration Certificate

Big, costly loads are safe with Acco Registered® Sling Chains

• Pictured above is a huge, 35,000-pound casting being lifted *easily and safely* by a 4-leg ACCO *Registered* Sling Chain. Directly beneath the load is a highly polished and machined crank shaft worth many thousands of dollars.

Imagine the cost in lost labor and materials, should the sling chain fail! But it won't fail—for this ACCO *Registered* Sling Chain and all its components have the inbuilt strength needed to handle the job with complete safety!

When you buy an ACCO *Registered* Sling Chain, you get these four exclusive "plus values" which *add materially to the worth, but not to the cost,* of the sling:

1 • **Accoloy X-weld 125 Chain**, for extra strength. This chain hangs straight . . . does not kink . . . has extra resistance to bending.

2 • **New Shaped Master Link**, uniquely shaped to withstand deformation under loads up to 18% greater than a round-section link can do.

3 • **ACCO Registration Ring**, serially numbered as evidence that the assembled sling has been factory proof-tested to twice its working load limit.

4 • **Registration Certificate**, signed by us, attesting to the field-tested design and proof-testing of the complete sling.

Remember, the best sling is one of your most economical material-handling tools. You'll find it good business to consult your ACCO *Registered* Sling Chain Distributor on all your sling needs; his counsel is available without obligation. If you don't know his name, write us at York, Pa.

WHAT "ACCO REGISTERED" MEANS

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

American Chain Division
AMERICAN CHAIN & CABLE
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit,
*Houston, *Los Angeles, *New York, Philadelphia, Pittsburgh,
*Portland, Ore., *San Francisco

**Indicates Warehouse Stocks*

ACCO
A C Co
TRADE MARK

DO YOU HAVE TO ANSWER THIS IMPORTANT QUESTION . . .

?

O_2

SHOULD WE MAKE OUR OWN OXYGEN ?

Your decision on whether to buy oxygen or make your own can have an important bearing on the profitability and efficiency of your operation. In many cases, oxygen can best be supplied from an established producer. But your oxygen requirements may justify a plant of your own.

Messer Experience Can Help You Decide

Messer's broad experience in the design and engineering of air separation equipment has been of value to some of America's largest manufacturers. More than 1000 Messer-engineered plants are operating successfully all over the world (183 in the United States).

For unbiased and authoritative advice on oxygen or nitrogen production, consult American Messer. *We will welcome your inquiry.*

AMERICAN MESSER CORPORATION

CHRYSLER BUILDING • 405 LEXINGTON AVE., N.Y.C.

"There Is No Substitute for Messer Experience"

Messer

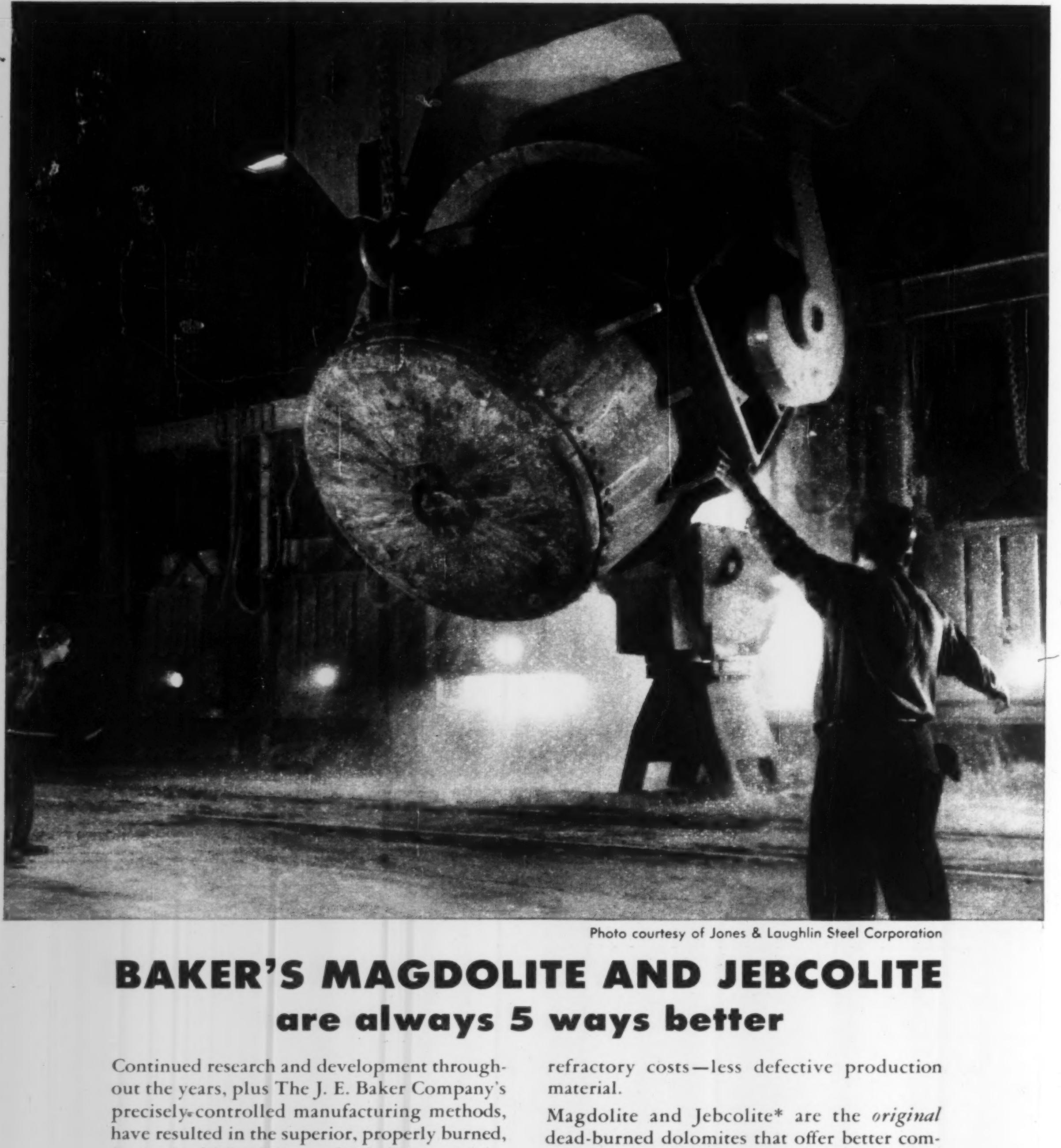


Photo courtesy of Jones & Laughlin Steel Corporation

BAKER'S MAGDOLITE AND JEBCOLITE

are always 5 ways better

Continued research and development throughout the years, plus The J. E. Baker Company's precisely-controlled manufacturing methods, have resulted in the superior, properly burned, grain-sized Magdolite and Jebcolite particles which help provide:

More uniform ingots—increased ingot production—increased furnace efficiency—lower refractory costs—less defective production material.

Magdolite and Jebcolite* are the *original* dead-burned dolomites that offer better composition, preparation, strength, economy and quality. Don't say "dolomite." Save dollars. Specify Baker's Magdolite for open hearth and Jebcolite for electric furnace use.

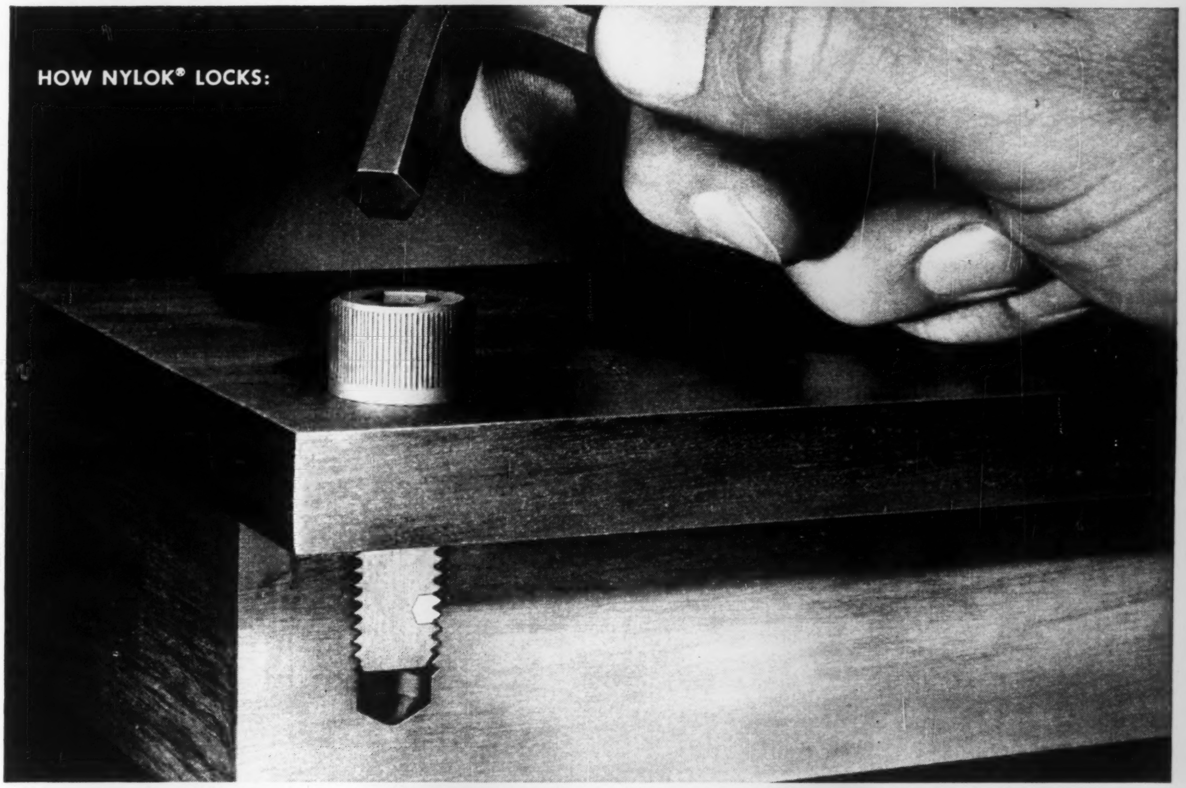
* *Jebcolite has the same superior chemical, physical and mineralogical characteristics as Magdolite and differs only in grain size which is designed specifically for electric furnace application.*

JEBCO
PRODUCTS
SINCE 1889

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA

PLANTS: BILLMEYER, YORK, PENNSYLVANIA — MILLERSVILLE, OHIO



LOCKED! The tough, resilient nylon pellet keys itself into the mating threads. It forces threads together, and locks the screw securely.

NEW—a complete line of self-locking UNBRAKO socket screw products that won't work loose

They simplify design and save production time

UNBRAKO socket screws are now available embodying the Nylok self-locking principle. Nylok provides a truly practical new solution to the problem of making screws self-locking.

You save production time when you build products with self-locking UNBRAKOS. And you get greater simplicity in design with less bulk and weight. The number of parts you must assemble to achieve full locking action is reduced to the absolute minimum. Lockwashers under screw heads are no longer necessary. Costly wiring of cross drilled heads is eliminated. So are cotter pins and complex multiple set screw installations.

Self-Locking UNBRAKOS are completely reusable. They have uniform locking and installation torques—with no galling or seizing on mating threads. They successfully withstand temperatures from —70° to 250°F. And, on properly seated screws, the pellet acts as a liquid seal.

Self-locking UNBRAKO socket screws come in a complete range of standard sizes and materials. See your authorized industrial distributor. Technical data and specifications are detailed in Bulletin 2193. Write us for your copy today. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

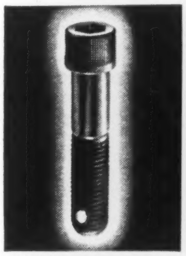
We also manufacture precision titanium fasteners. Write for free booklet.

UNBRAKO SOCKET SCREW DIVISION

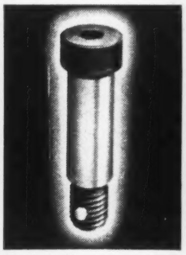
STANDARD PRESSED STEEL CO.

SPS

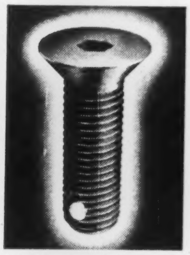
JENKINTOWN PENNSYLVANIA



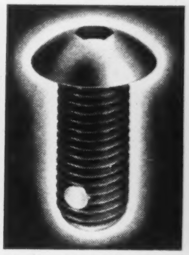
Socket head cap screws. Standard sizes #6 to 1 in.



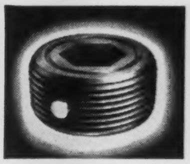
Socket shoulder screws. Standard sizes ¼ to ¾ in.



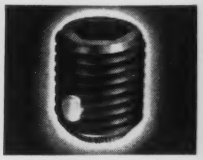
Flat head socket screws. Standard sizes #6 to ¾ in.



Button head socket screws. #6 to ⅜ in.



Socket pressure plugs. Standard sizes 1/16 to 1¼ in.



Socket set screws. All standard point types. #6 to 1 in.

IT PAYS TO BUY ELECTROMET ALLOYS BECAUSE…

ELECTROMET maintains a complete line of highest-quality ferro-alloys and alloying metals in all commercial sizes and grades.

Prompt shipment of ELECTROMET ferro-alloys is assured from our 7 plants and 9 warehouses conveniently located throughout the United States to serve you.

ELECTROMET's experienced field metallurgists are always available to assist you in using ferro-alloys more efficiently.

Contact any ELECTROMET office listed below for complete information about ELECTROMET ferro-alloys and metals.

ALLOYS AND METALS FOR EVERY NEED

Boron, Calcium, Chromium, Columbium, Manganese, Silicomanganese, Silicon, Titanium, Tungsten, Vanadium, Zirconium, "EM" Briquets.

Information about these and other alloys and metals is contained in our catalog, "ELECTROMET Ferro-Alloys and Metals."

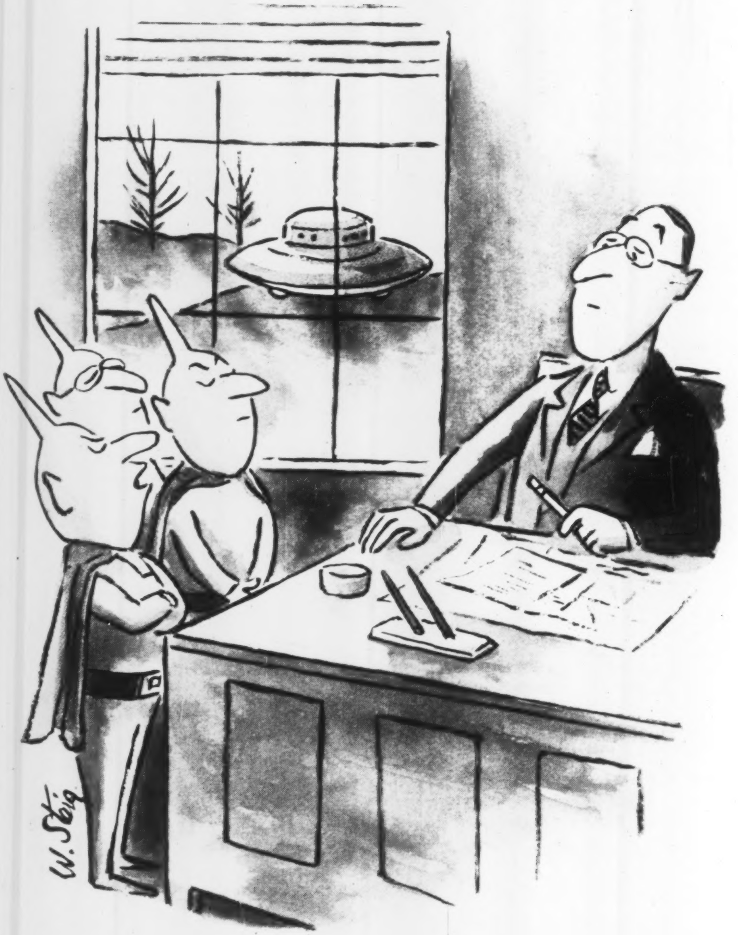
For your copy write ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 E. 42nd Street, New York 17, N. Y. *In Canada:* Electro Metallurgical Company, Division of Union Carbide Canada Limited, Toronto.

METALS DO MORE ALL THE TIME . . . THANKS TO ALLOYS

Electromet

FERRO-ALLOYS AND METALS

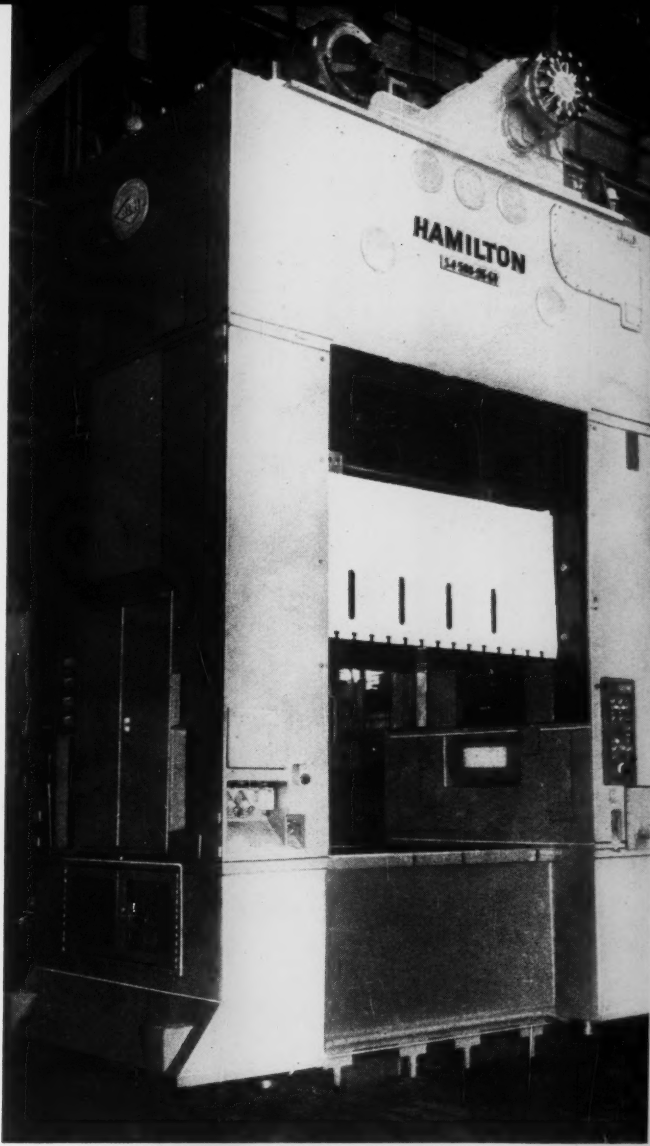
UNION CARBIDE



"We came down here to buy ELECTROMET alloys—up home, everyone says they're out of this world."

The terms "Electromet," "EM" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

Hamilton 400-ton 2-point eccentric press



Hamilton 500-ton 4-point eccentric press

Hamilton mechanical presses spell the maximum in versatility

No matter what your press requirements are, you probably won't have to incur the extra expense of special designing and "tailor-made" manufacturing if you explore the versatility of the two basic Hamilton press designs pictured above.

The Hamilton 400-ton 2-point eccentric press represents our conventional design, meeting all the basic needs of stamping plants all over the world. And it is so designed that many optional features may be readily added to transform it into a press capable of doing more highly specialized work.

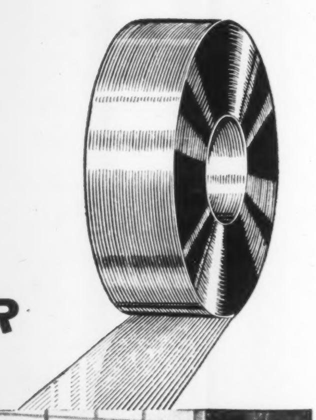
Extra features include automation equipment, air and electric controls and outlets, die lights, die safety blocks, provision for feeds, inbuilding and automatic circulating oil lubrication. These features are built into the 4-point press shown above. Let your Hamilton sales engineer discuss your needs with you.

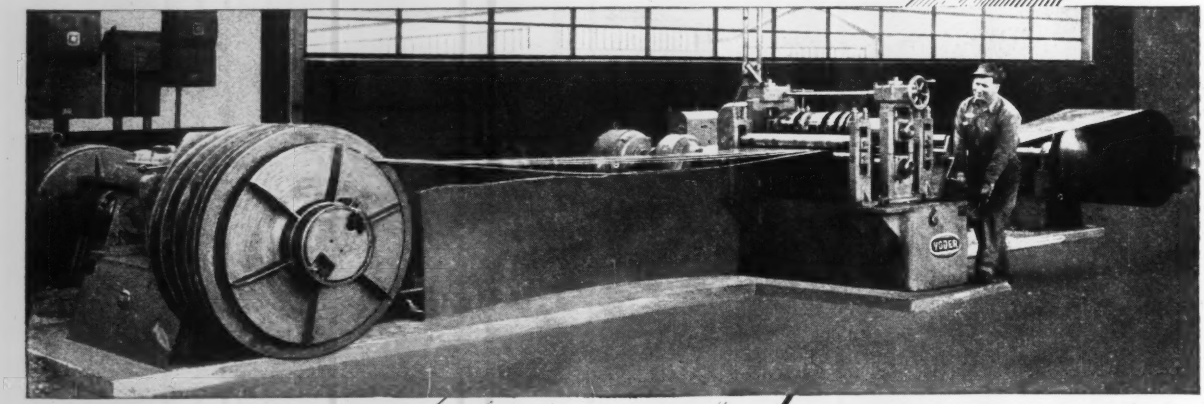
Hamilton Division Hamilton, Ohio

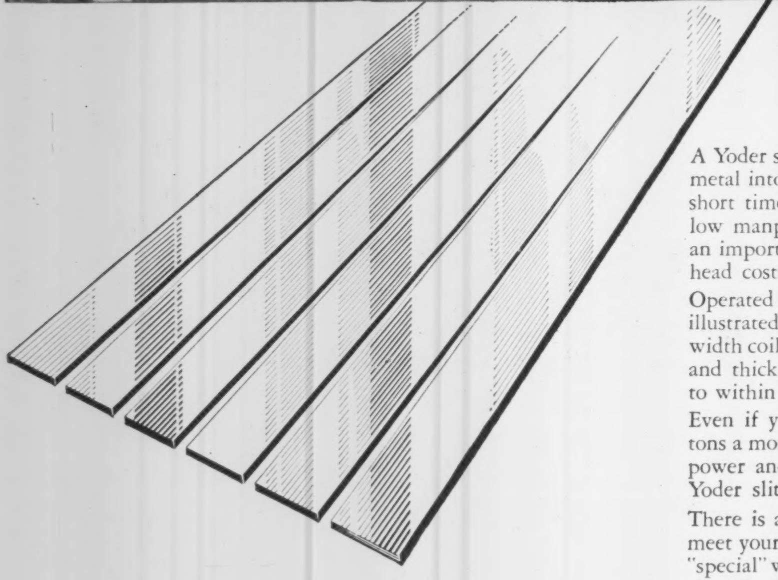
BALDWIN · LIMA · HAMILTON

Diesel engines • Mechanical and hydraulic presses • Can making machinery • Machine tools

from cold strip to slit strands
IN SECONDS...
with a YODER
ROTARY MULTIPLE SLITTER







A Yoder slitter converts mill-width coils of flat-rolled metal into many variable-width strands in amazingly short time. Speed, coupled with great accuracy and low manpower requirements, makes a Yoder slitter an important factor in keeping production and overhead costs down.

Operated by only two men, the Yoder Type 3-48 slitter illustrated is designed to accommodate standard mill-width coils up to 48 inches wide, in a variety of metals and thicknesses. The slit strand widths can be held to within a .004" tolerance.

Even if your steel requirements are as little as 100 tons a month, the savings to be realized in time, manpower and raw material costs alone will pay for a Yoder slitter in the first few months of operation.

There is a Yoder slitter designed and engineered to meet your requirements, and to speed the delivery of "special" width stock in a wide range of large or small sizes. Send for your free copy of the fully-illustrated, 76-page booklet, "Multiple Rotary Slitting Lines."

THE YODER COMPANY
5502 Walworth Avenue • Cleveland 2, Ohio

ENGINEERING
YODER
MANUFACTURING

ROTARY SLITTING LINES

PIPE AND TUBE MILLS (ferrous or non-ferrous)

COLD ROLL FORMING MACHINES

USE FINKL DIE BLOCKS
FOR QUALITY FORGINGS

...the automotive industry does!

An upstate New York forge shop specializes in the forging of crankshafts, knuckles, and other high production items used in automotive production. Because the volume of each particular forging is very high, it is possible to evaluate costs and study tooling very closely

In the illustration above, the manufacturer is using Durodi for both the blocking and finishing crankshaft impressions in this forging press operation.

Durodi, made by Finkl electric furnace quality steel practice is a high volume producer and a most practical hot work tool for close die forgings. It hardens deeply and uniformly, is resistant to abrasion and withstands both shock and impact loading at high hardness. Its Special Machining Quality also appreciably reduces sinking time. All of these advantages mean more production at less cost.

Finkl die blocks are available in several grades, all sizes and tempers to handle virtually any forging requirement. Call your local Finkl representative next time you are considering die blocks or forgings. He will be glad to help you and there is no obligation.

DIE BLOCKS · FORGINGS · HOT WORK STEELS · ELECTRIC FURNACE STEELS
F

A. Finkl & Sons Co.
2011 SOUTHPORT AVE · CHICAGO 14, ILLINOIS

Offices in: BOSTON · PITTSBURGH · ALLENTOWN · BIRMINGHAM · DETROIT · CLEVELAND · INDIANAPOLIS · CHICAGO
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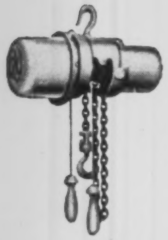
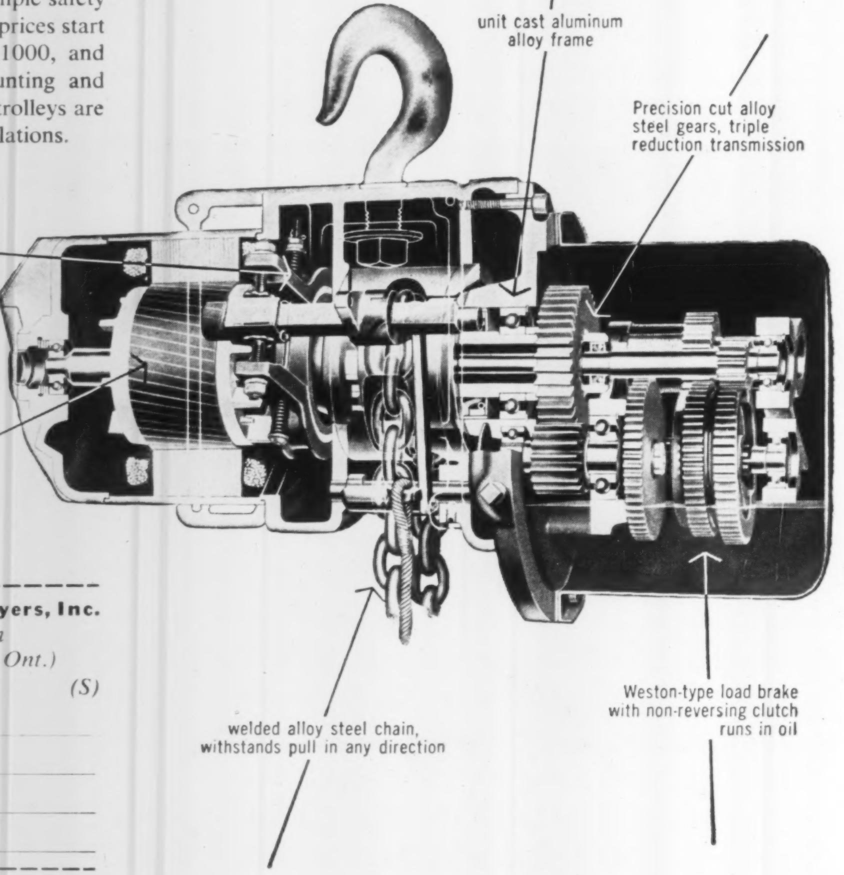
Warehouses in: BOSTON · DETROIT · CHICAGO · LOS ANGELES



JC chain hoists are ahead of competition in quality—right with it in price. See for yourself why more value for the same money is yours in the JC. The ½ hp R&M heavy duty motor is equipped with an oversize shoe brake to assure quick stops, accurate load spotting, longer life. Separate load brake is Weston-type, with non-reversing clutch to prevent drift. Gearing—triple reduction precision cut alloy steel spur gears, heat treated. Running in sealed splash-oil bath, ball bearings, gears, and load brake are continually lubricated for maximum service life. The light-weight JC hoist can be moved easily, has ample safety factor. Immediate delivery. Low prices start at $207. JC available in 500, 1000, and 2000 lb. capacities. Hook mounting and rope control standard, but push trolleys are available for most I beam installations.

quality to spare


unit cast aluminum alloy frame
Precision cut alloy steel gears, triple reduction transmission
ample shoe type motor brake
R&M ½ hp hoist motor 30 minute, 55 C rating
Weston-type load brake with non-reversing clutch runs in oil
welded alloy steel chain, withstands pull in any direction

take it up with Robbins & Myers, Inc.
Hoist & Crane Division
Springfield, Ohio (Brantford, Ont.)
Send JC hoist bulletin. *(S)*

*Name*____________________

*Title*____________________

*Company*____________________

*Address*____________________

ROBBINS & MYERS **hoists • cranes • winches**

Brush wire, crimped (as shown) or straight, now produced in multiple strand, and furnished in coils or straight hanks depending on wire size.

How a **new idea in wire** *cleaned up a brush production problem*

● Maybe you can profit by the kind of interest and action applied to customers' problems by the Worcester Wire Works Division of National-Standard. Take wire brush manufacture for example . . .

Until recently, brush manufacturers had to cut through a coil of wire, then gather by hand and by guesswork the approximate number of wires for the type of brush in production. Naturally this involved a lot of cut-off waste, plus the wire lost through faulty guesswork.

Now, to overcome this waste, Worcester Wire Works has developed ways to produce and furnish wire in predetermined bunches (up to 400 wires per bunch) with *exactly* the right number of wires for a given brush. Much costly loss is eliminated, more brushes are produced per pound of wire, and production is speeded.

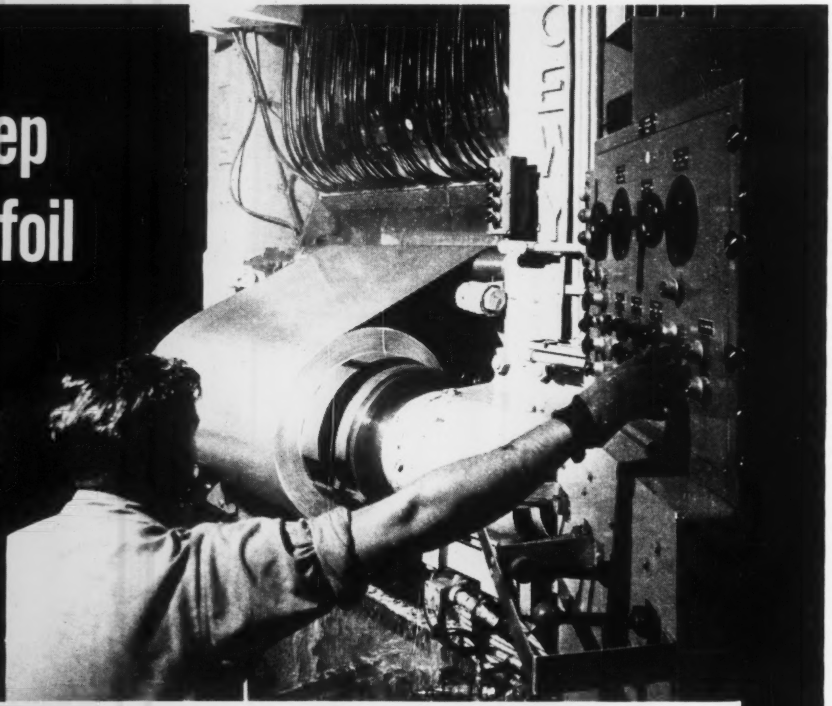
The point is, Worcester Wire Works people specialize in more than quality wire. They also specialize in the kind of service and exploration that time and again cuts costs for customers. Better check with them on your wire needs. You'll like the way they do business.

NATIONAL STANDARD

DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless, music spring and plated wires* • **WORCESTER WIRE WORKS, Worcester, Mass.;** *high and low carbon specialty wires*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • **ATHENIA STEEL, Clifton, N. J.;** *flat, high carbon spring steels* • **REYNOLDS WIRE, Dixon, Ill.;** *industrial wire cloth*

how to keep aluminum foil from shattering

... at 35 miles per hour!



Kaiser Aluminum & Chemical Corp. increased annual production of aluminum foil 50% at its Permanente, California plant through installation of a four high foil mill. This mill reduces aluminum strip in thickness from .026 to .00025 of an inch at speeds up to 3000 fpm.

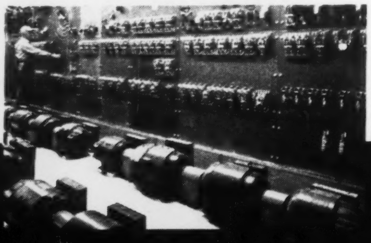
At 35 miles per hour, excessive strain at any of the several reduction stages would shatter the extremely thin foil. From the original payoff reel through to the final rewind, uniform tension is provided by Reliance V★S Drives.

Reliance engineers built this drive specifically for this mill, to provide the constant uniform tension which is so important.

This application is typical of the many diversified jobs that Reliance V★S Drives are called upon to perform. There is a Reliance V★S Drive to fit your application.

D-1562

For further details, write Dept. 41A



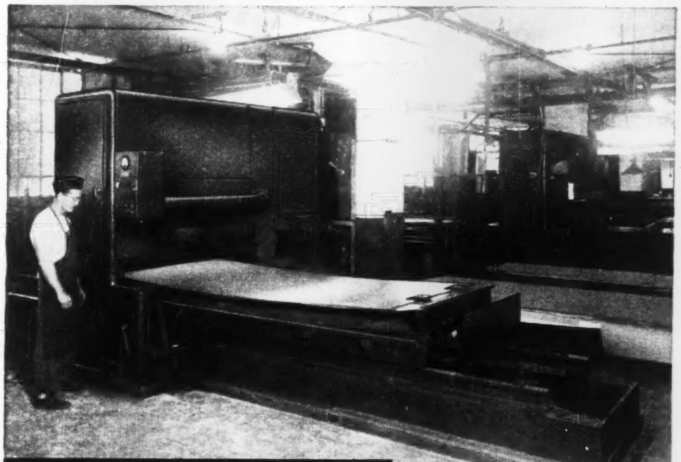
Main control room—Where Reliance equipment provides more than 2,900 hp. to drive this mill.

RELIANCE ELECTRIC AND ENGINEERING CO.

CLEVELAND 17, OHIO • CANADIAN DIVISION: WELLAND, ONT.

Sales Offices and Distributors in Principal Cities

HILL GRINDING AND POLISHING MACHINES
For FINISHING
Any and All
FERROUS and NON-FERROUS MATERIALS . . .



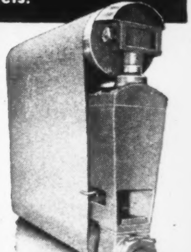
HILL Polishing Machine
(Hydraulic Table Type)
For polishing individual sheets and plates. Hydraulic reciprocating table with centralized controls.

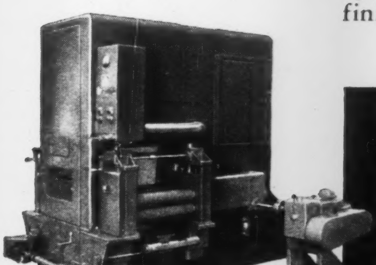
FLAT surfaces of ferrous or non-ferrous material can be brought quickly to the high finish so necessary for today's industrial and consumer products. The dairy, automotive, home appliance and engraving industries are typical of the wide range of application for these precise, labor saving machines.

HILL abrasive belt grinding and polishing machines are built in two general types. The hydraulic reciprocating table type polished individual sheets and plates. Table widths vary from 36″ to 60″. Table lengths range from 60″ to 240″. The Pinch-Roll type is for progressive line polishing. The HILL two-roll vertical head with endless abrasive belt is the basic principle common to both types.

When writing for information please indicate size and specifications of stock to be finished.

The basic HILL two-roll vertical head with upper steel idler roll and lower rubber covered contact or work roll (both dynamically balanced) over which the endless abrasive belt travels.





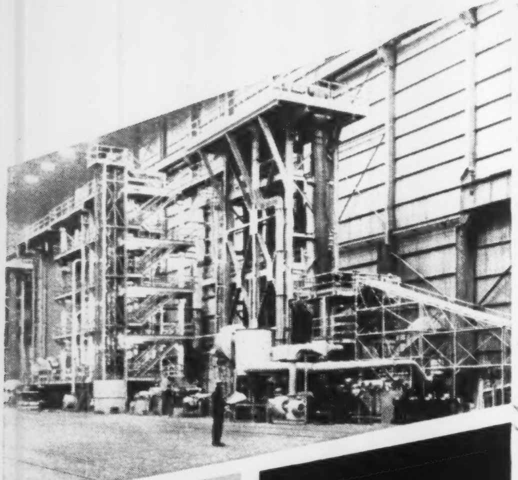
HILL Grinding and Polishing Machine
(Pinch-roll Type)
For pre-finishing, conditioning and polishing. Used as single units or in multiple units for progressive line polishing in wet or dry operations.

HILL ACME
TOOLS FOR
INDUSTRY

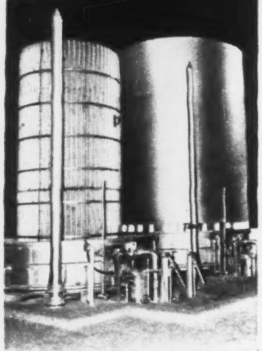
THE HILL ACME COMPANY

HILL DIVISION
ESTABLISHED 1882
1201 West 65th Street • Cleveland 2, Ohio

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES

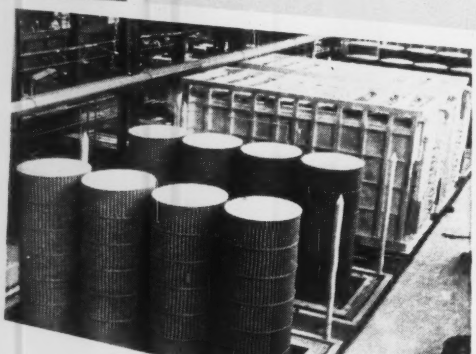


VERTICAL STRIP ANNEALER



SINGLE-STAND ANNEALERS

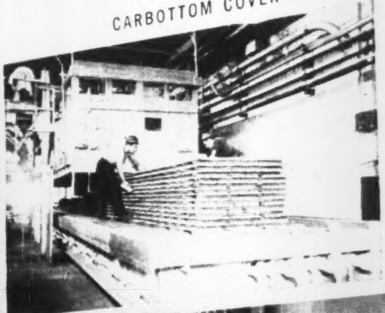
CONTINUOUS STRIP GALVANIZER

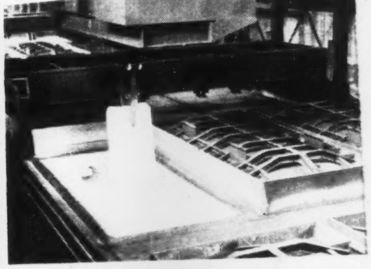


MULTIPLE-STAND ANNEALERS

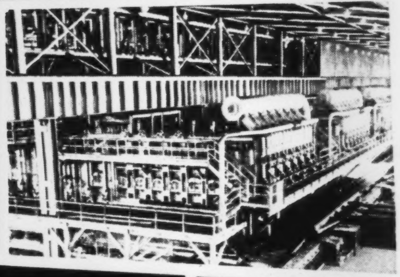
foundation for steel mill profits

CARBOTTOM COVER FURNACE

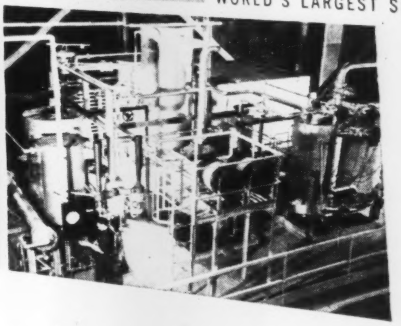




ONE-WAY FIRED SOAKING PITS



WORLD'S LARGEST SLAB HEATER



HNX® GAS GENERATOR

You put a solid foundation under your profits whenever you specify Surface equipment. Whatever type it may be, you know it is supported by many interlocked blocks of know-how in heating and handling steel.

The technical skills which Surface has developed in building soaking pits will benefit the man who buys Surface annealing covers. In the same way, Surface concepts of slab heating contribute to high-speed stress relieving . . . carbon restoration to strip annealing . . . controlled atmospheres to wire patenting.

Because of this broad and deep foundation of experience, Surface can improve any single process in the context of a complete sequence of operations. This is to the customer's profit, as many companies will confirm.

Surface Combustion Corporation, 2408 Dorr St., Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

Surface®

wherever heat is used in industry

[illegible] COMPANIES: [illegible] Furnaces, Ltd., Chesterfield • Stein & Atkinson, Ltd., London • Stein & Roubaix, Paris • [illegible]
[illegible] • [illegible] Stein, [illegible] • Chugai Ro Kogyo Kaisha, Ltd., Osaka • [illegible]

Reduce Down Time and Operating Costs with

High Quality

A. P. GREEN

REFRACTORY PRODUCTS

High quality A. P. Green refractory products pay off in service with greater tonnages, smoother operation, and lower maintenance costs.

There is an A. P. Green product designed to meet industry's requirements for almost any type service. You'll find that it pays to standardize on A. P. Green quality products.

For specific recommendations on your refractory problems, get in touch with your local A. P. Green distributor. He's listed in the yellow pages of your telephone directory.

MORTARS

A.P. Green
SATANITE
SUPER FIRE-CLAY MIXTURE
SAIRSET
A.P. GREEN FIRE BRICK CO.
MEXICO, MISSOURI, U.S.A.
A.P. Green
KD-2
DRY AIR SETTING HIGH TEMPERATURE BONDING MORTAR
KEEP DRY
A.P. GREEN FIRE BRICK COMPANY

PLASTIC FIREBRICK

HIGH ALUMINA PLASTIC
Super HYBOND
A.P. GREEN FIRE BRICK CO.
A.P. Green
SUPER-PLASTIC
GREEN-X
A.P. GREEN FIRE BRICK CO.
A.P. Green
PLASTIC QUIK-PAK

CASTABLE REFRACTORIES

KEEP DRY
A.P. Green
KAST-SET
A.P. GREEN FIRE BRICK COMPANY
KEEP DRY
A.P. GREEN
KAST-O-LITE
80 POUNDS NET
MADE IN U.S.A.
A.P. GREEN FIRE BRICK CO.

PLANTS:
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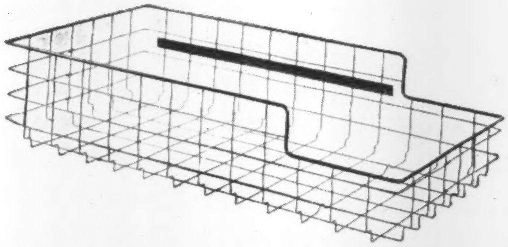
Sulphur Springs, Texas—Jackson,
Oak Hill, South Webster, Ohio
Philadelphia, Pa.—Troy, Idaho

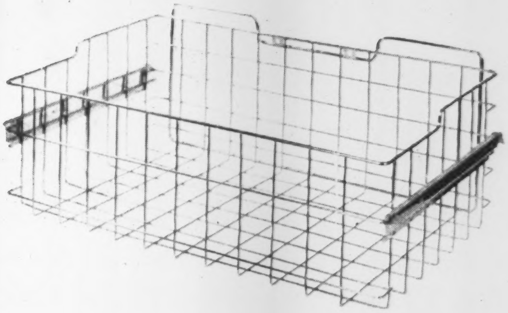
IN CANADA:
A. P. Green Fire Brick Company, Ltd.
Toronto 15, Ontario

A. P. Green
REFRACTORY
PRODUCTS

A.P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U.S.A.

DISTRIBUTORS IN THE PRINCIPAL CITIES OF THE WORLD





YOUNGSTOWN EXTRA SMOOTH CLEAN BRIGHT BASIC WIRE

Plus Automated Fabrication Techniques Gives High Quality Production to Bauer Brothers

Bauer's "Flying Dutchman" using Youngstown Extra Smooth Clean Bright Basic Wire automatically fabricates a frame into a finished shelf in only 60 seconds.

Over 75 years of production know-how combined with an excellent background of engineering experience enables the Bauer Brothers Co. of Springfield, Ohio, to provide their customers with economical, intelligent, up-to-the-minute wire product designs.

Using the latest techniques in "automation", this progressive fabricator relys on Youngstown's Extra Smooth Clean Bright Basic Industrial Quality Wire to keep both their production and product quality at a high level. They find it forms easily—while still providing the necessary rigidity and strength required in their finished products.

Its surface is free from all oil, dirt and grease which enables plating that's permanent—won't flake off. Also, it spot-welds fast and sure for permanent, strong construction. Why not make it your continuing specification for increased production and profits.

All Youngstown Wire is quality-controlled through each integrated operation from ore mining to final drawing. Thus, you can be sure there will be no injurious seams and piping, laps, die marks or internal tearing and cupping to hold up your production lines.

For additional information or metallurgical assistance, write or phone your nearest Youngstown District Sales Office today.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
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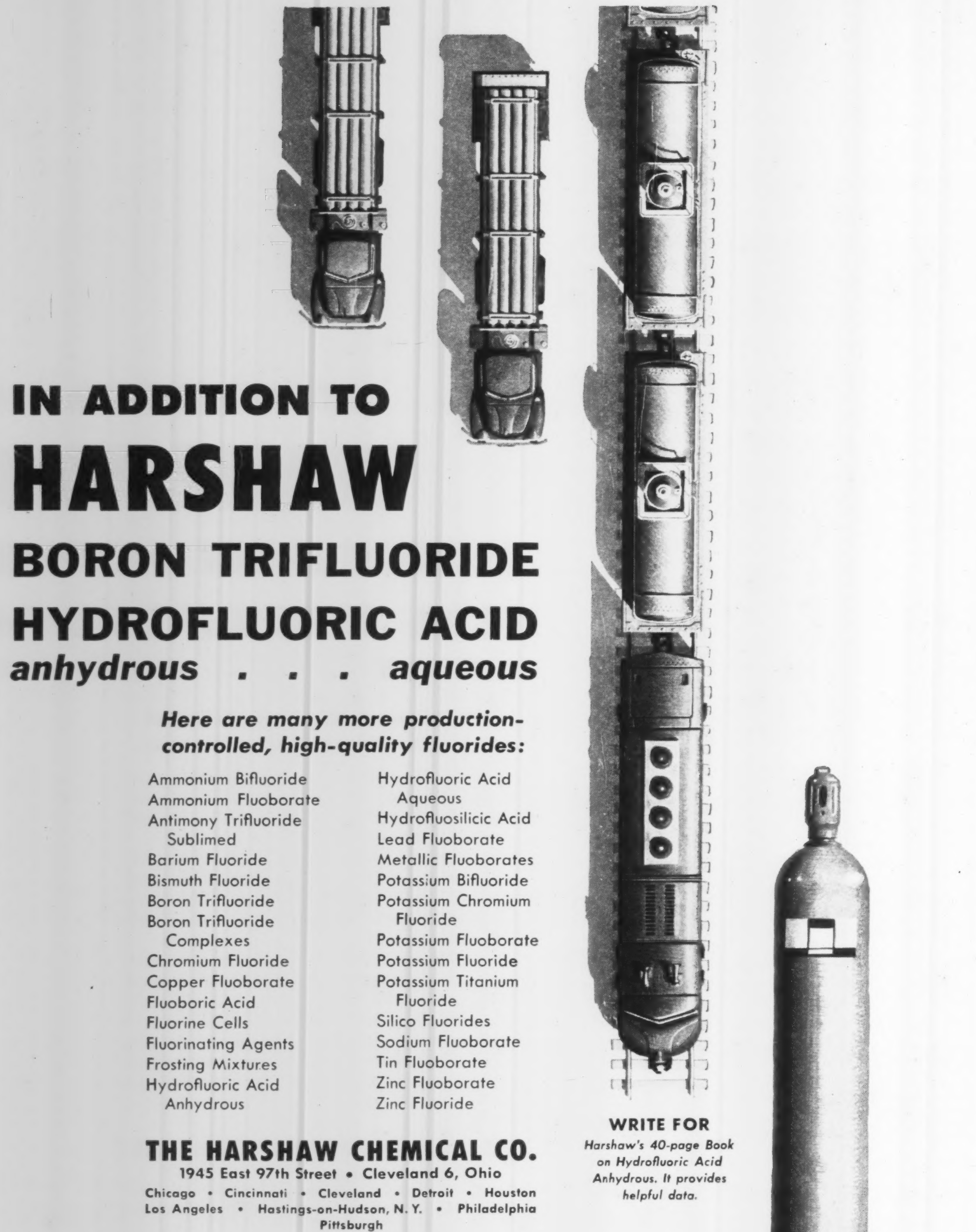

IN ADDITION TO

HARSHAW

BORON TRIFLUORIDE

HYDROFLUORIC ACID

anhydrous . . . aqueous

Here are many more production-controlled, high-quality fluorides:

- Ammonium Bifluoride
- Ammonium Fluoborate
- Antimony Trifluoride Sublimed
- Barium Fluoride
- Bismuth Fluoride
- Boron Trifluoride
- Boron Trifluoride Complexes
- Chromium Fluoride
- Copper Fluoborate
- Fluoboric Acid
- Fluorine Cells
- Fluorinating Agents
- Frosting Mixtures
- Hydrofluoric Acid Anhydrous
- Hydrofluoric Acid Aqueous
- Hydrofluosilicic Acid
- Lead Fluoborate
- Metallic Fluoborates
- Potassium Bifluoride
- Potassium Chromium Fluoride
- Potassium Fluoborate
- Potassium Fluoride
- Potassium Titanium Fluoride
- Silico Fluorides
- Sodium Fluoborate
- Tin Fluoborate
- Zinc Fluoborate
- Zinc Fluoride

WRITE FOR
Harshaw's 40-page Book on Hydrofluoric Acid Anhydrous. It provides helpful data.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street • Cleveland 6, Ohio
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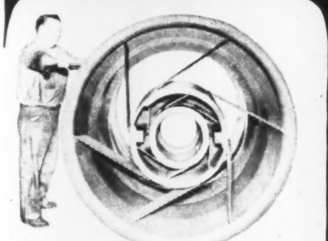
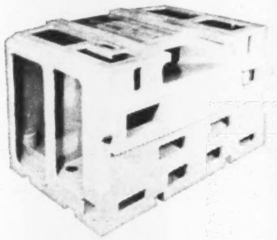
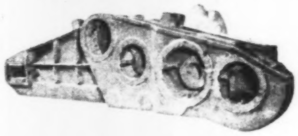
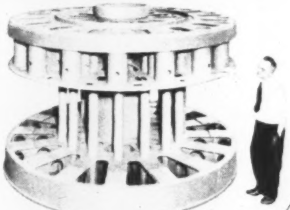


Steel-Weld
FABRICATION

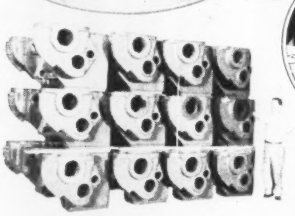


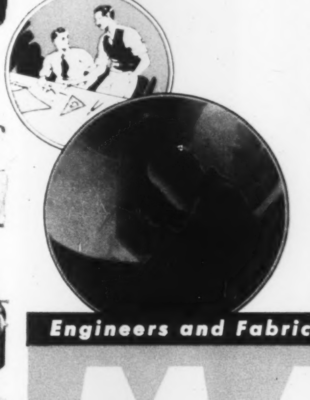


Use WELDED STEEL for Greater Strength with Less Weight!

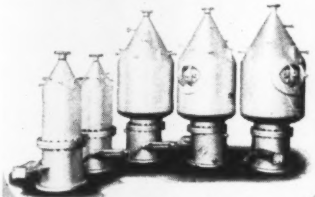


The weldment shown above is the frame for a sixteen cylinder Diesel Engine designed for a potential of 5000 H.P. This precision piece, and those illustrated at the left are typical of thousands of Steel-Weld Fabricated parts and assemblies produced by Mahon each year for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. If you are not now taking full advantage of the economies offered by welded steel components in your product, you should give the matter serious thought. In the design of almost any type of heavy machinery there are parts and sub-assemblies that can be produced more economically, more satisfactorily, and in less time, in welded steel. In weldments you get greater strength with less weight—plus the additional advantages of greater rigidity and 100% predictability. When you consider weldments, you will want to discuss your requirements with Mahon engineers, because, in the Mahon organization you will find a unique source for weldments or welded steel in any form . . . a fully responsible source with complete facilities for design engineering, fabricating, machining and assembling . . . a source where design skill is backed up by craftsmanship which assures you a finer appearing product embodying every advantage of Steel-Weld Fabrication. See Sweet's Product Design File for information, or have a Mahon sales engineer call at your convenience.





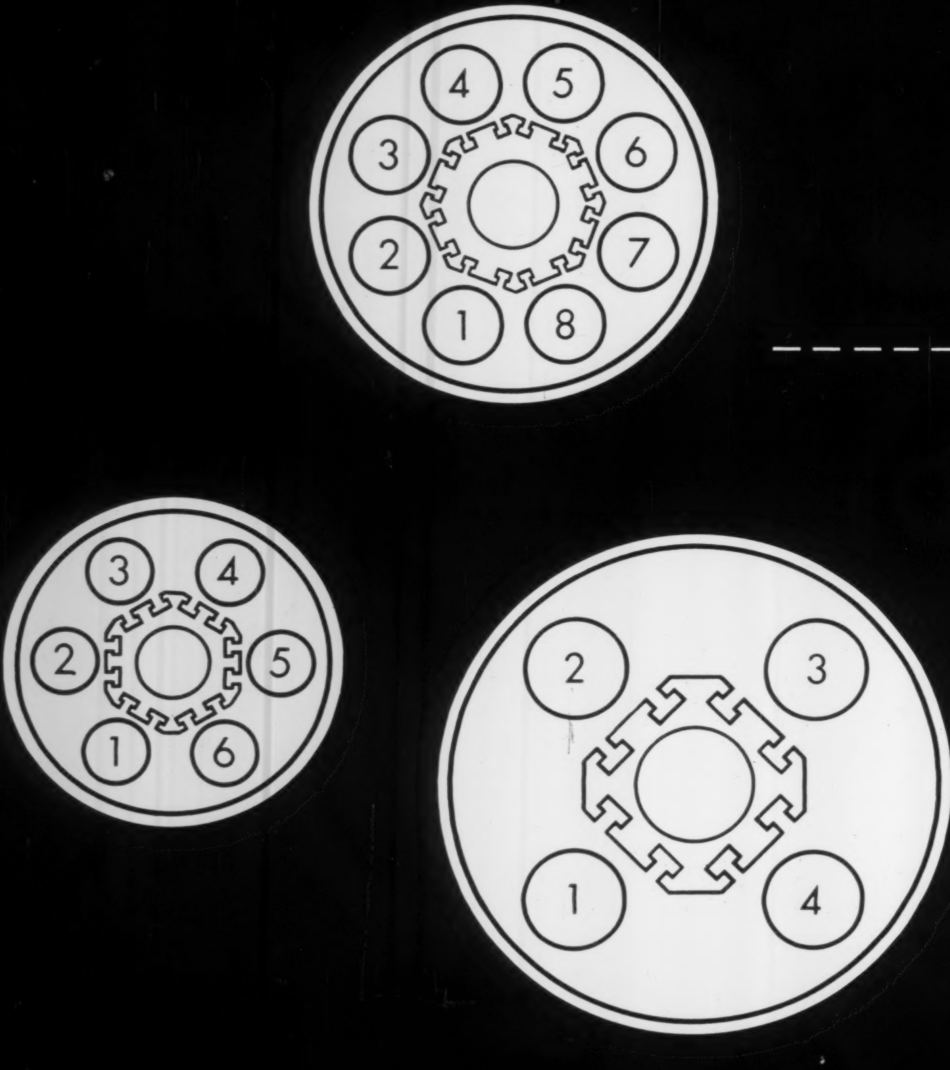
THE R. C. MAHON COMPANY • Detroit 34, Michigan
Sales-Engineering Offices in Detroit, New York and Chicago



Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

a message to production-minded engineers with automated equipment in mind



These multiple-spindle diagrams are symbols of one of the earliest, simplest, and yet most efficient forms of automation the world has yet known. They represent circumferential automation, a design principle embodied in the development of the first automatic screw machine, built in 1893 by National Acme and inherent in all Acme-Gridleys since then.

don't overlook the advantages of

circumferential automation*

* Think of each spindle on an Acme-Gridley multiple-spindle automatic as a work station, and you will quickly see that here, too, is automation . . . *circumferential* automation. Here, as in all forms of automation, pre-sequenced operations are *performed in succession—and without manual attention*—to save time and cut costs in many ways.

Actually, circumferential automation goes all other forms one step better; rather than requiring a line of machines and transfer arrangements, Acme-Gridley's speedy, compact spindle arrangement *saves floor space, machine investment and man hours.*

Admittedly, multiple spindle operation is not the answer to all machining problems. Today however, production men are taking a closer look to be sure they are missing no bets. They cannot afford to be wrong tomorrow.

Is there a place for *circumferential* automation in *your* operation? Let us help you find out.

National Acme

THE NATIONAL ACME COMPANY, 189 E. 131ST ST., CLEVELAND 8, OHIO • Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

builders of the world's only complete line of
multiple-spindle, bar and chucking automatics

TV TAMES GIANT WELDMENTS

for Morgan Engineering cranes and mill equipment

New automation techniques put responsibility for precision manufacture of Morgan cranes and mill equipment in the hands of skilled technicians . . . plus exacting, efficient production facilities.

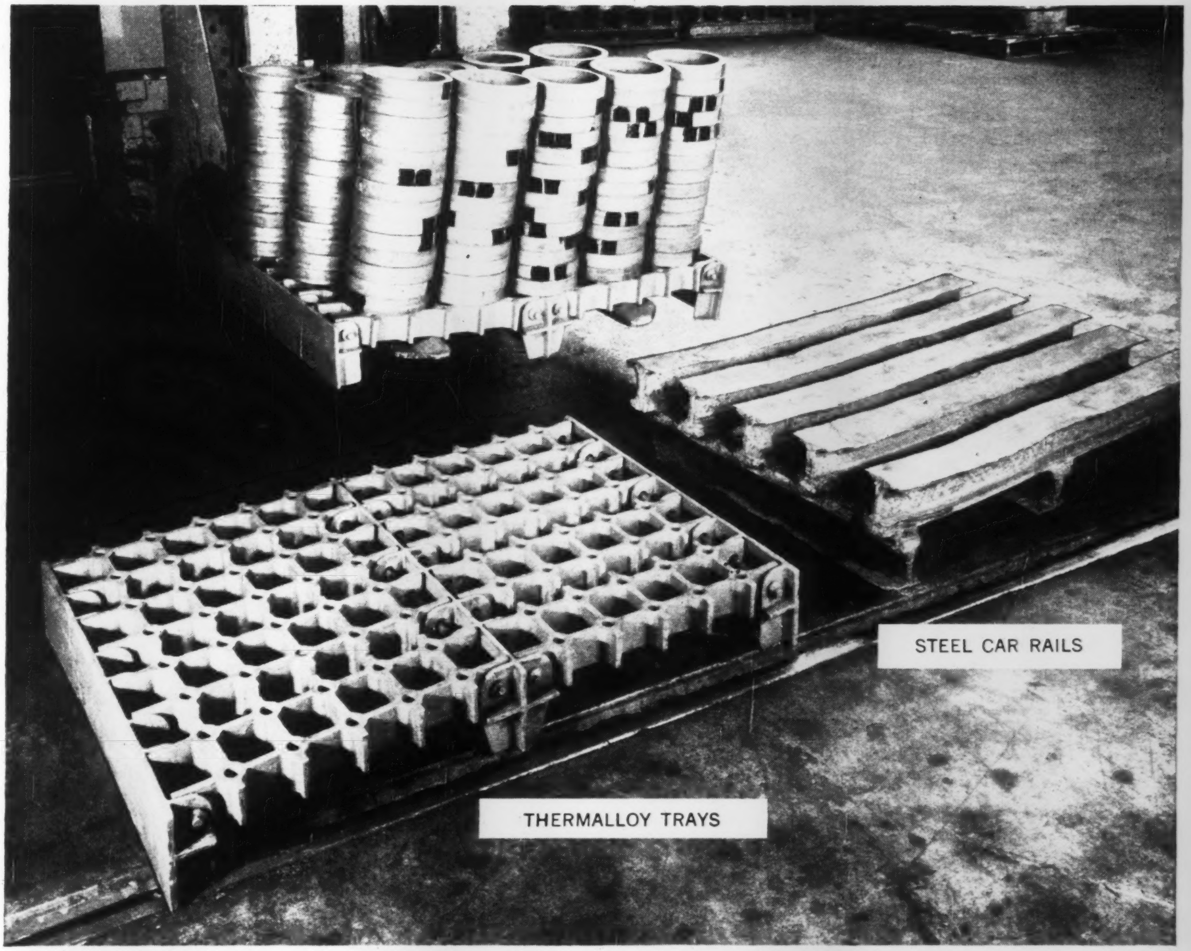
This 135-ton milling and boring machine, for example, handles giant weldments with new speed and ease . . . but maintains the extreme accuracy we demand for all components of Morgan-built equipment. An interesting feature is a television screen that lets the operator read vernier scales on a lower level without leaving the control platform.

Automatic submerged arc welding of girders . . . a 52-foot stress relieving furnace . . . the world's largest flame cutting facilities and other new production facilities contribute to the "extras" you get in today's Morgan-built products. Let our representative help *you* plan for more profitable, continuous-flow production with Morgan cranes and mill equipment.

INGERSOLL
INGERSOLL

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

Overhead electric traveling cranes, gantry cranes, open hearth special cranes, plate mills, blooming mills, structural mills, shears, saws and auxiliary equipment.



Thermalloy* Heat-Resistant Trays Cut Costs for SKF Industries

At SKF Industries in Philadelphia, steel forgings are annealed in a car-type furnace at temperatures between 1450 and 1650 degrees F. Steel car rails were used to support the forgings in the furnace. But these warped and scaled after short service and became useless.

At the same time, SKF tried the specially designed trays of Thermalloy "30" shown above. These trays have given *six times the service life* obtained from the rails—and are still in use, with many more months of service left. In a cost comparison with the steel rails, SKF found that the Thermalloy trays were less expensive, considering *only* their service life to date.

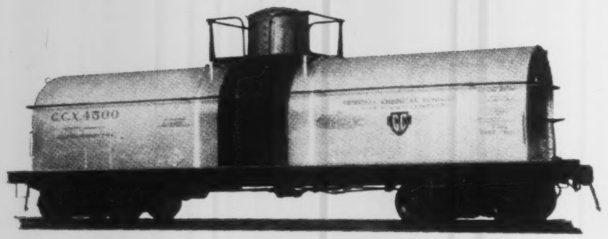
Thermalloy heat-resistant alloys and Electro-Alloys' design know-how are providing longer service life in scores of heat-treat applications and are saving money for users.

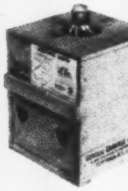
Whatever your heat-treat problem, it pays to contact Electro-Alloys. For further technical information on Thermalloy trays and fixtures, call your nearby Electro-Alloys representative or write for Bulletin T-227. Electro-Alloys Division, 9041 Taylor St., Elyria, Ohio.

*Reg. U. S. Pat. Off.

AMERICAN Brake Shoe COMPANY

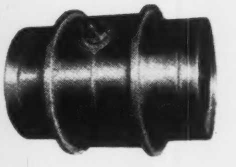
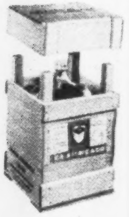
ELECTRO-ALLOYS DIVISION Elyria, Ohio





NITRIC ACID

. . . every grade, every strength!

General Chemical Production Facilities Assure Uninterrupted Service

To keep pace with constantly increasing demands, General Chemical has recently expanded the capacity of its already large-scale Nitric Acid facilities. Today, three major plants—in Buffalo, N. Y., Newell, Pa. and Hedges, Wash.—provide steady, dependable customer service.

As a prime source of supply for Nitric Acid for more than 50 years, General offers the largest selection of grades and strengths on the market. It has a knowledge of the product, its properties and applications that can be extremely helpful to every user. This accumulated experience is at your service whether your interests are in basic industrial uses or in such advanced applications as rockets and missiles.

For further information—or for any quantity from carboys to carloads—just call the nearest General Chemical office below.

ALL GRADES AND STRENGTHS, including:

Standard & Diamond
36°, 38°, 40°, 42° Baume; 95-98%

Photo Engravers
36°, 38°, 40°, 42° Baume

Reagent, A.C.S.
Sp. Gr. 1.42

Red Fuming
Technical, Various Strengths of NO_2 content (with or without HF inhibitor)
Reagent, Sp. Gr. 1.59-1.60

White Fuming
Technical, 97.5% HNO_3 (with or without HF inhibitor)
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Mixed Acids and other Specialized Formulations

Available in tank cars and tank trucks, carloads, drums and carboys.

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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GC
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Basic Chemicals for American Industry

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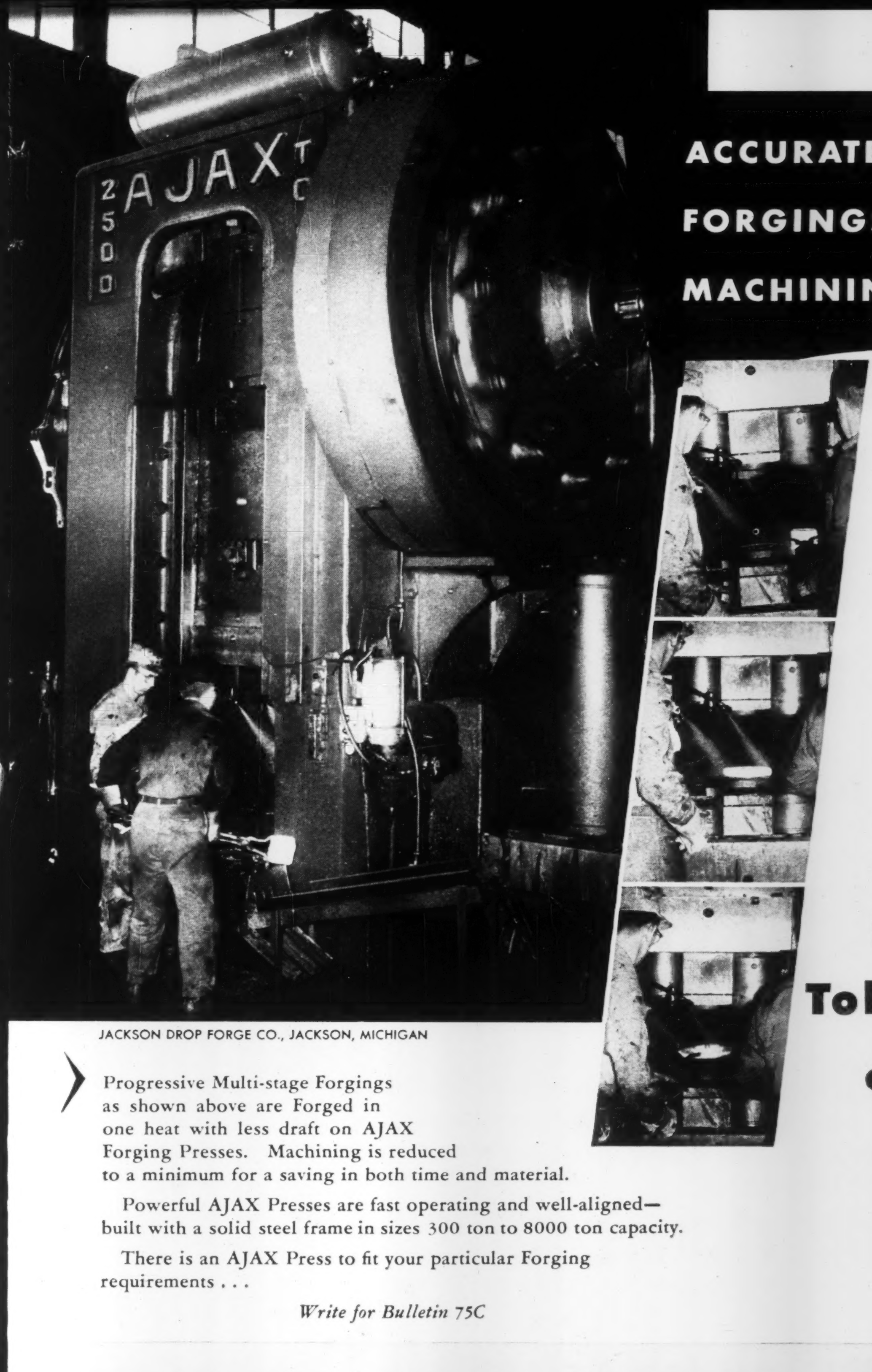
ACCURATE PRESS FORGINGS REDUCE MACHINING COSTS



JACKSON DROP FORGE CO., JACKSON, MICHIGAN

Forged to Close Tolerances on AJAX Forging Presses

Progressive Multi-stage Forgings as shown above are Forged in one heat with less draft on AJAX Forging Presses. Machining is reduced to a minimum for a saving in both time and material.

Powerful AJAX Presses are fast operating and well-aligned—built with a solid steel frame in sizes 300 ton to 8000 ton capacity.

There is an AJAX Press to fit your particular Forging requirements . . .

Write for Bulletin 75C

AJAX **METAL WORKING MACHINES**

FORGING PRESSES — FORGING MACHINES — FORGING ROLLS — AJAX-HOGUE WIRE DRAWERS

THE AJAX MANUFACTURING COMPANY . . . . CLEVELAND 17, OHIO

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W. P. WOOLDRIDGE CO. • BURLINGAME, CAL. • LOS ANGELES 22, CAL.

Need Tubing? Then . . .

LOOK NO FURTHER FOR QUALITY

Because *BISHOP* small diameter tubing is not excelled in accuracy of I.D. and O.D. . . . in dimensional precision . . . in tolerances . . . in finish.

Whether it be for a precision part in an instrument . . . a heat exchanger in today's high speed aircraft . . . a thermocouple . . . an electronic or atomic application.

Wherever tubing is needed to meet corrosion, heat, shock, stress, psi pressure resistance and vibration . . . for highest quality and performance *specify* BISHOP tubing, at comparable prices.

SEAMLESS AND WELDED AND DRAWN STAINLESS STEEL TUBING
Mechanical, Capillary, Hypodermic and Aircraft Grade
(.008" to 1.000" O.D.—.003" to .083" Wall)

NICKEL AND ALLOY TUBING
(up to .625" O.D.)

TUBULAR FABRICATED PARTS
Flanged, Flared, Milled,
Slotted, Swaged and Threaded

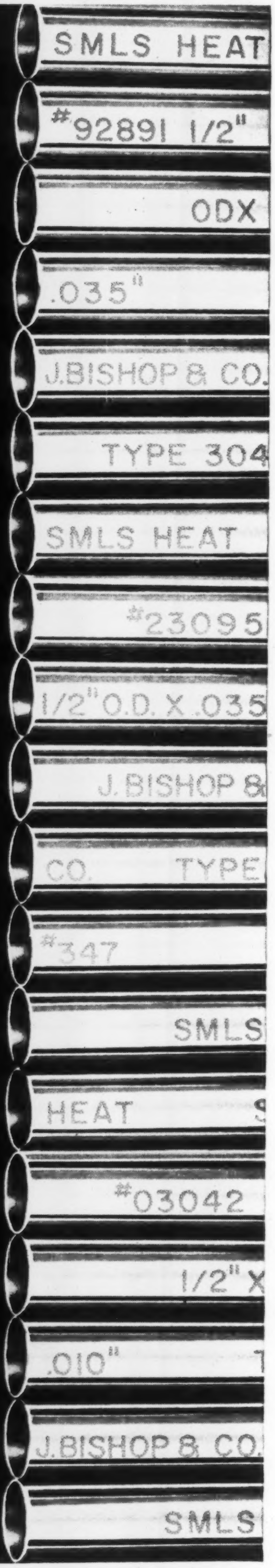
GLASS-TO-METAL SEALING ALLOYS

CLAD METALS & COMPOSITE WIRES

Catalogs on Request. For Prompt Service, Fast Deliveries Call Malvern, Pa. 3100

JB

STAINLESS STEEL PRODUCTS DIVISION
J. BISHOP & CO. **Platinum Works**
Malvern, Pennsylvania


SMLS HEAT
#92891 1/2"
ODX
.035"
J.BISHOP & CO.
TYPE 304
SMLS HEAT
#23095
1/2" O.D. X .035
J. BISHOP &
CO. TYPE
#347
SMLS
HEAT
#03042
1/2" X
.010"
J.BISHOP & CO.
SMLS

Daily savings with Wagner Rectifiers...

plus less upkeep and downtime

Part of a shipment of 38 Wagner Germanium Rectifiers, 13 regulators and three automatic plating machines for a leading business machine manufacturer.

Just what does the higher efficiency of Wagner Selenium Electroplating Rectifiers mean to *you?* Of interest to management-minded men is the day to day *decrease* in the use of AC current—and in most plating shops that is a big item. *Why* less current? Because the comparatively greater stack area for a similar *rating* (up to 40% more rectification area) results in lower temperature rise, hence more DC power delivered to your tank for the AC input.

Then there are even greater but less predictable savings. The conservative ratings of Wagner Rectifiers due to the ample stack areas mean longer stack life (less chance of burn-outs) and ample capacity for overloads. You virtually eliminate interruptions for maintenance with the resultant idle labor and loss of production, not to mention the cost of replacing stacks. Wagner transformers, too, are specially designed for electroplating applications; they are provided with Class B non-flammable insulation (glass, mica, asbestos, etc.) for safety and extra long service life. Cooling fans are standard, easily replaced in minutes, and in the event of a ventilating failure, the rectifier may be operated without exceeding the maximum safe operating temperature; Wagner Rectifiers do not reach this point until subjected to an overload of 500% of normal rating.

Cost-minded? Weigh these day by day savings, plus the greatly reduced maintenance costs of Wagner Rectifiers—*plus* the *safety* features which extend the life of this valuable equipment—and call the Wagner man in your area. If you have an electroplating problem—or a parts handling problem before or after plating—lay it in his lap and we'll pitch in to work out a solution. Remember, Wagner Brothers is your *one* source for anodes, chemicals, rectifiers, automatic and semi-automatic equipment, all manufactured by one company.

MANUFACTURERS AND PROCESSORS OF ALL METAL-FINISHING CHEMICALS, ANODES, AND EQUIPMENT

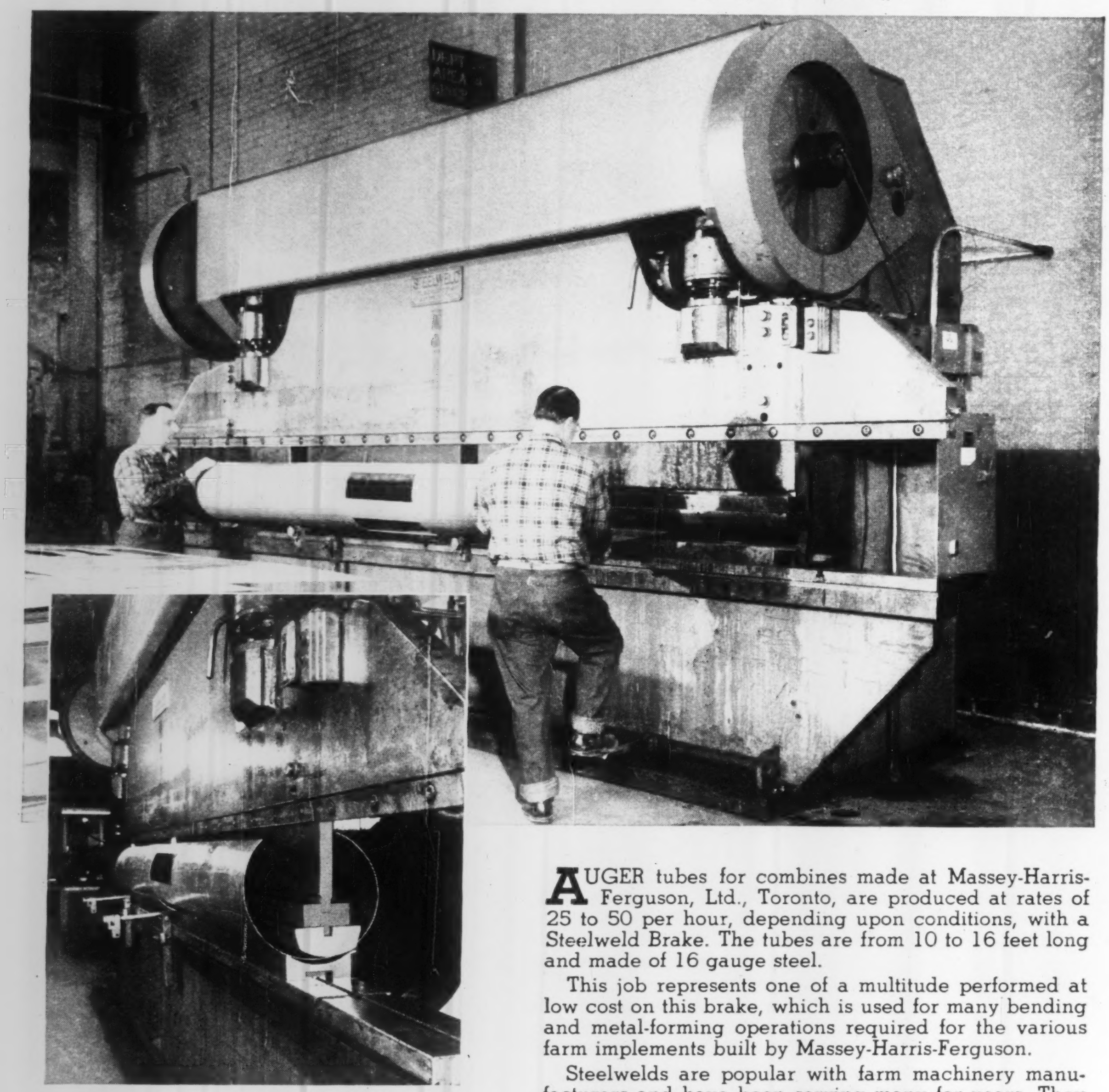
400 MIDLAND AVE., DETROIT 3, MICHIGAN
CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • SYRACUSE • GRAND RAPIDS

Wagner BROTHERS INC.

COMBINE AUGER TUBES

25 to 50 Made Per Hour at Massey-Harris-Ferguson, Ltd.

Steelweld Brake in service since 1950. Bed and ram are 18′-0″ long including 2′-0″ extensions at both ends. Bending capacity rated at 12′ x $\frac{3}{16}$″.



Flat metal is quickly formed into a cylinder by a series of pressure contacts with this die arrangement.

AUGER tubes for combines made at Massey-Harris-Ferguson, Ltd., Toronto, are produced at rates of 25 to 50 per hour, depending upon conditions, with a Steelweld Brake. The tubes are from 10 to 16 feet long and made of 16 gauge steel.

This job represents one of a multitude performed at low cost on this brake, which is used for many bending and metal-forming operations required for the various farm implements built by Massey-Harris-Ferguson.

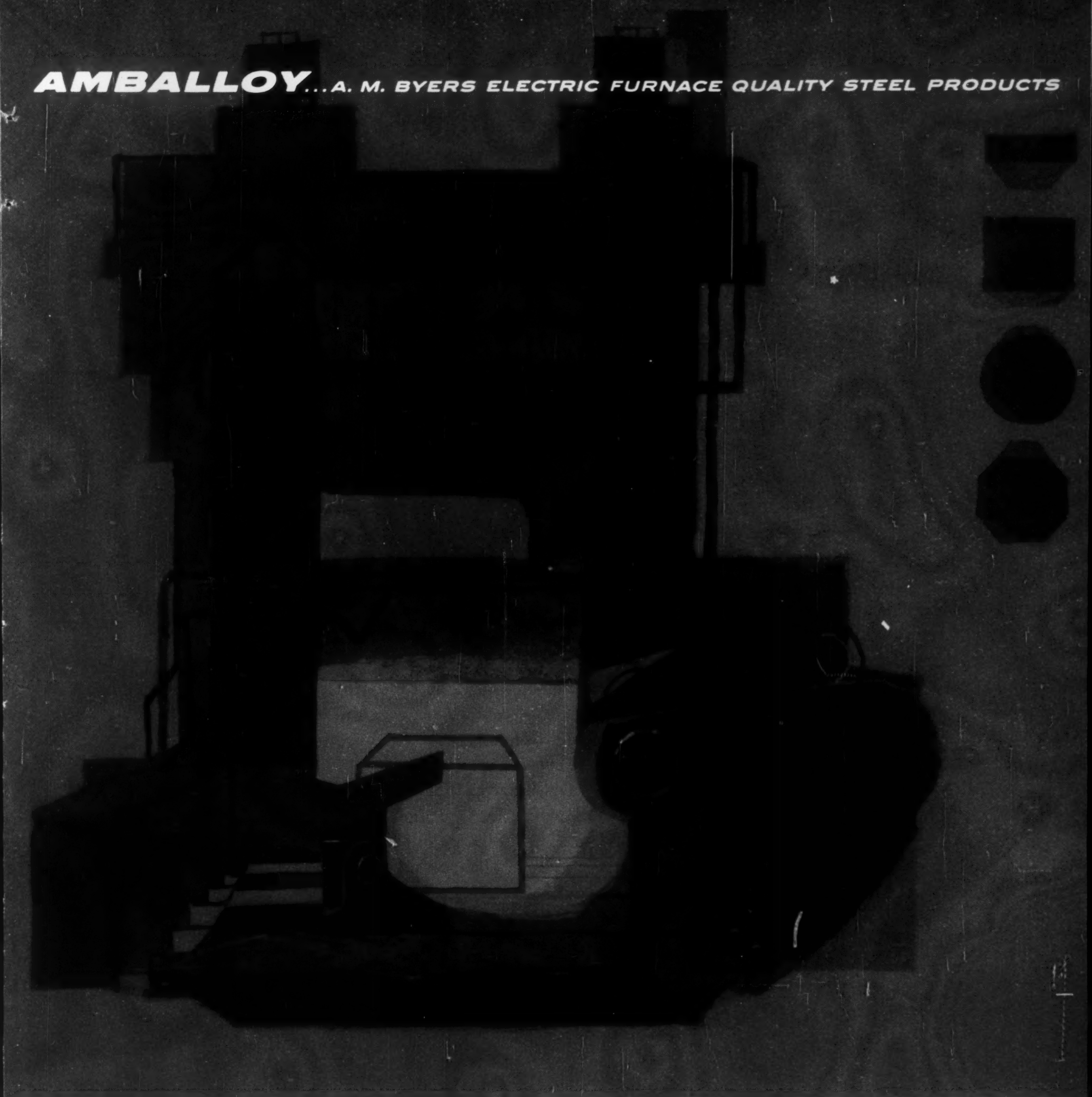
Steelwelds are popular with farm machinery manufacturers and have been serving many for years. They perform accurately, keep going continuously on long production runs without need of frequent adjustments, tinkering and maintenance. They are easy and safe to operate. Dies are quickly changed.

Because Steelweld Brakes are heavily built machines loaded with features that will help you, it will be to your interest to give them serious consideration when additional brakes are needed.

STEELWELD
PRESS BRAKES

Write for free copy of Catalog No. 2010
Gives construction and engineering details

STEELWELD DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7868 E. 281 ST. • WICKLIFFE, OHIO



AMBALLOY...A. M. BYERS ELECTRIC FURNACE QUALITY STEEL PRODUCTS

FROM HIGH-GRADE PRODUCTION FACILITIES...BETTER END PRODUCTS

The consistent quality of AMBALLOY specialty steels—stainless, alloy and carbon—is rooted in the exacting quality control of our high-grade production facilities.

We match these facilities with sound furnace practice and skillful melting procedures. Precise control by men of ability and experience assure the quality of each heat. This detailed attention we give to every step of the steel-making process means better end products for users of AMBALLOY.

And to provide you with helpful solutions to your material selection problems, Byers offers a staff of highly trained metallurgists. We can serve you with knowledge and facilities that put your order where you want it, when you want it. Check Byers first. Write or call for details. A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

A growth company with the emphasis on quality and service **A. M. BYERS COMPANY**

MEN WHO BUY STEEL SAY THIS:

"Steel Service Centers help us avoid excessive production costs"

"Steel Service Centers, as we know them today, are economically necessary to us in maintaining *maximum productivity* throughout the Corporation.

"For instance many of our products, particularly in the electrical appliance area, are subject to variable customer needs which quickly affect the demand for them. Our productive facilities must be adaptable to those variations—many of which cannot possibly be anticipated.

"Steel for these quick changes must be available—at the right time—in sufficient quantity—to the exact specification. If it isn't—production continuity is interrupted and our costs are instantly and disproportionately affected. In return, Steel Service Centers are entitled to a reasonable service charge."

Call in your Steel Service Center representative. Discuss with him the advantages of using his large, varied steel stocks . . . his efficient cutting and handling equipment . . . his fast delivery service. You can be sure, like Westinghouse, that your plant's productivity can be materially increased—and costs reduced. AMERICAN STEEL WAREHOUSE ASSOCIATION, INC., 540 Terminal Tower, Cleveland 13, Ohio.

A. M. Kennedy, Jr., Vice President, Purchases and Traffic
Westinghouse Electric Corporation

AMERICAN STEEL
WAREHOUSE ASS'N.

YOUR STEEL SERVICE CENTER

call KE for plant expansion or new facilities

call KE for plant expansion or new facilities

INGENUITY

has made KE a major engineer-contractor serving

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Ingenuity at work—produces better, faster construction, at lower cost; more efficient and profitable operation.

Ingenuity is a hallmark of Kaiser Engineers—has been for over 40 years of contracting. Experienced KE design and construction engineers can advance your new plant plans from conversation to completion, quickly, at lower cost. Or, they can undertake any single part of a project. One contract can cover all.

With your first thought of expansion, call KE. At Kaiser Engineers, you receive the benefits of sound experience plus creative ingenuity that makes your new plant faster, cheaper, better.

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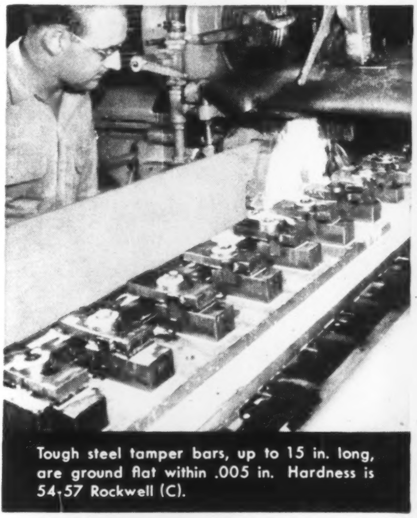
4381

CASE HISTORY NO. 42—STEEL TAMPER BARS

MATTISON
HIGH-POWERED PRECISION

GRINDING METHODS

Increasing stock removal by face grinding boosts production 26% . . . rejects eliminated!



Tough steel tamper bars, up to 15 in. long, are ground flat within .005 in. Hardness is 54-57 Rockwell (C).

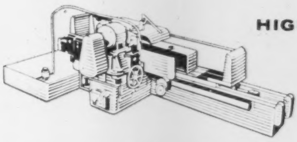
Greater contact area of the segmented wheel, backed up by rigidity and high horsepower of the Mattison No. 4000 hydraulic-feed face grinder, produced valuable production benefits in grinding tamper bars at the Barber-Greene Company, Aurora, Illinois.

The tough steel bars must be ground within .005 in. for flatness. Production officials of the company say: "Our grinder takes a good, deep cut out of the bars and does it speedily, without overheating." Time-study figures compiled over a three-month period show the following production gains over the old method: 19% increase grinding both ends; 29% increase grinding edges; and 30% increase grinding flats, an average of 26% gain in all operations on the "Mattison."

If you are doing a production machining job by milling, planing, shaping, or peripheral grinding, a Mattison face grinder or vertical spindle surface grinder probably can help you improve quality and reduce costs.

At Barber-Greene, for example, each of the wheel segments offers *ten square inches* of grinding surface in actual contact with the work, permitting high stock removal and efficient coolant distribution for fast grinding with minimum heat generation. Your Mattison dealer can arrange to have your parts test-ground in the Mattison Methods Laboratory

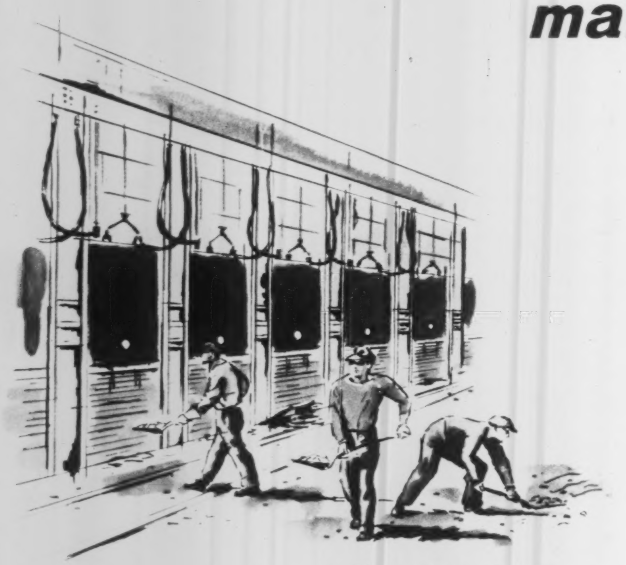
MATTISON
MACHINE WORKS
ROCKFORD ILL. U.S.A.



HIGH-POWERED
PRECISION
SURFACE
GRINDERS

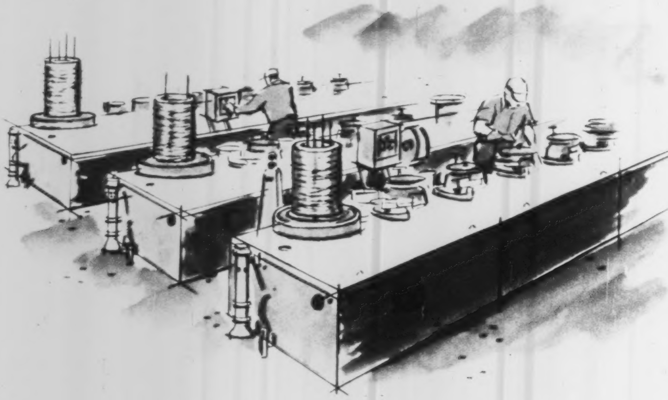
When you need wire . . .

make CF&I YOUR



New, improved facilities

CF&I's wire plants throughout the nation have been modernized to provide even greater benefit to customers for all types of wire. Open hearth capacity has been increased—rolling mills completely restyled—new wire drawing machines have been added—enlarged tempering and patenting furnaces installed.

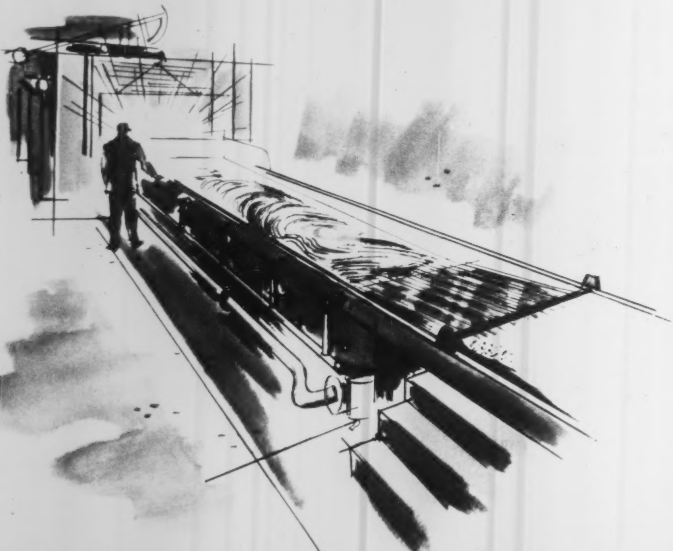


Modern packaging methods

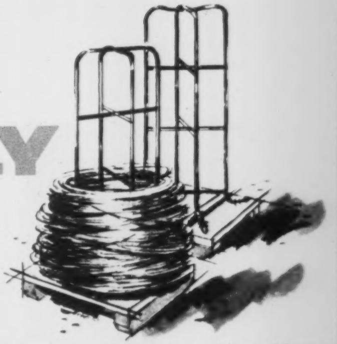
To supply CF&I Wire to customers in the type of package that best meets their requirements, we have new spoolers, steel strapping machines and additional packaging equipment. We can supply wire in continuous lengths on reels, "spiders", pallets, or in fibreboard (pay-off pak) containers.

This equipment, plus the skilled craftsmanship of our metallurgists and mill men, enables us to meet the most exacting specifications and to provide faster deliveries to wire users everywhere.

Whether you order in small lots or by the carload, you are certain of receiving prompt, dependable service—in damage-free (DF) cars, too, when requested. Let us know your requirements.



SOURCE OF SUPPLY


Non-returnable spiders

(500-700 lbs. capacity)

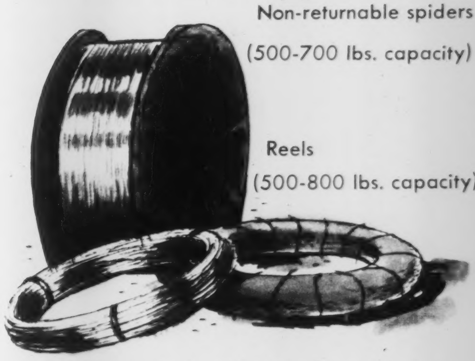
Here is a partial list of the many types of carbon steel wire manufactured by CF&I:

Grades

low carbon
  annealed
  flat and shaped
medium high carbon
high carbon
  flat and shaped
  oil tempered
  spheroidized

Finishes

bright dry drawn or lime bright
bright grease drawn
cadmium coated
coppered
extra clean smooth bright
galvanized
liquor
white liquor

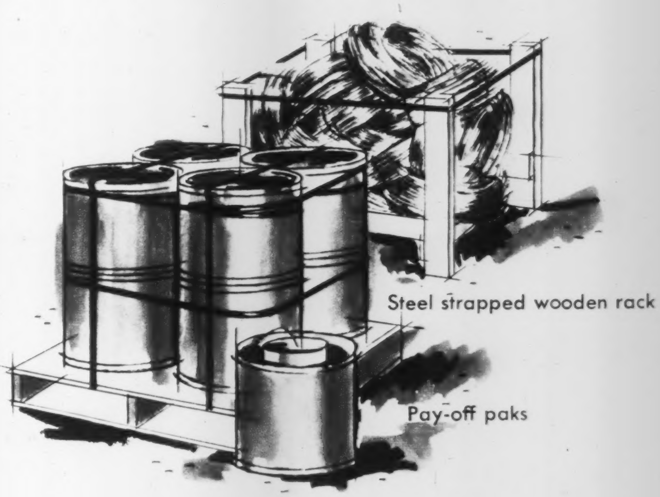

Reels

(500-800 lbs. capacity)

Steel strapped or paper wrapped coils

Standard Types (partial list)

aircraft cord
bee
bobbin ring
bobby pin
bookbinder
broom
brush
casing
clip
concrete reinforcing tie
cotter pin
curtain spring
die spring
fine & weaving
fuse
Gamma spring
garment hanger
glass netting
hair pin
hat
hose, reinforcement
hose, mechanical
hose, vacuum
lock spring
lockwasher
manufacturers' drawn
mattress
merchant
nail
oil tempered
picker tooth
picture cord
pin ticket
regulator
rope
safety pin
screen
shaft, flexible
Signal Corps
snake fishing
spiral binding
spring
square
stapling
staple
stone
tie
twisted & laid
upholstery
valve spring
weaving
welding
Wissco Iron


Steel strapped wooden rack

Pay-off paks

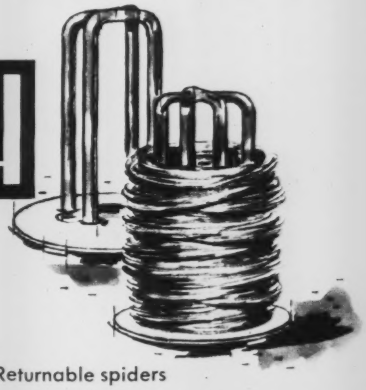
CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

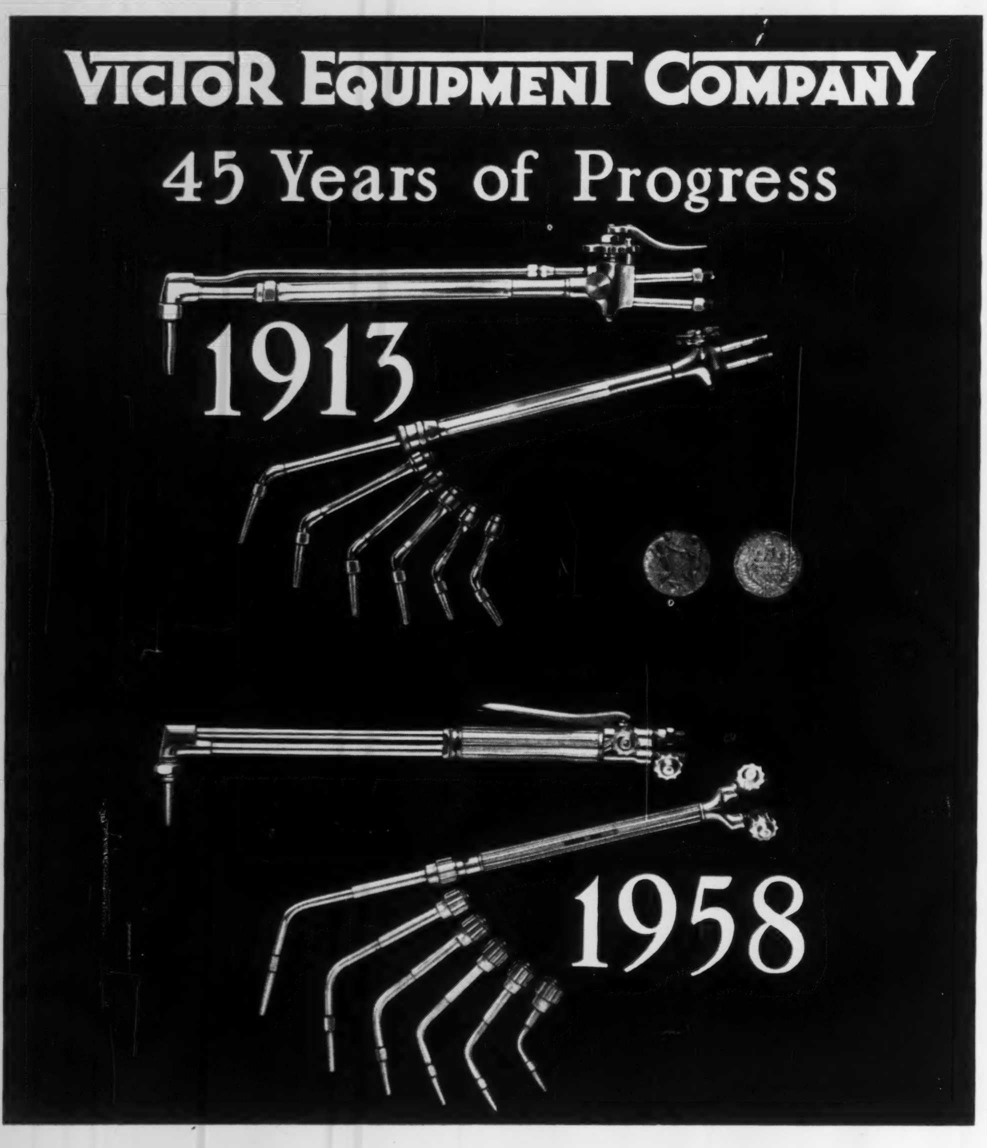
CF&I

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte Denver • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Oklahoma City • Phoenix • Pueblo Salt Lake City • Wichita • **PACIFIC COAST DIVISION**—Los Angeles • Oakland • Portland • San Francisco San Leandro • Seattle • Spokane • **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo Chicago • Detroit • New Orleans • New York • Philadelphia • **CF&I OFFICES IN CANADA:** Montreal Toronto • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg

5687


Returnable spiders

(2000-4000 lbs. capacity)



QUALITY . . . SERVICE

the original Victor welding and cutting torches were created in 1913 to fill the need for better and safer equipment—torches that were practical, versatile and built to last—created to be a victor in the field.

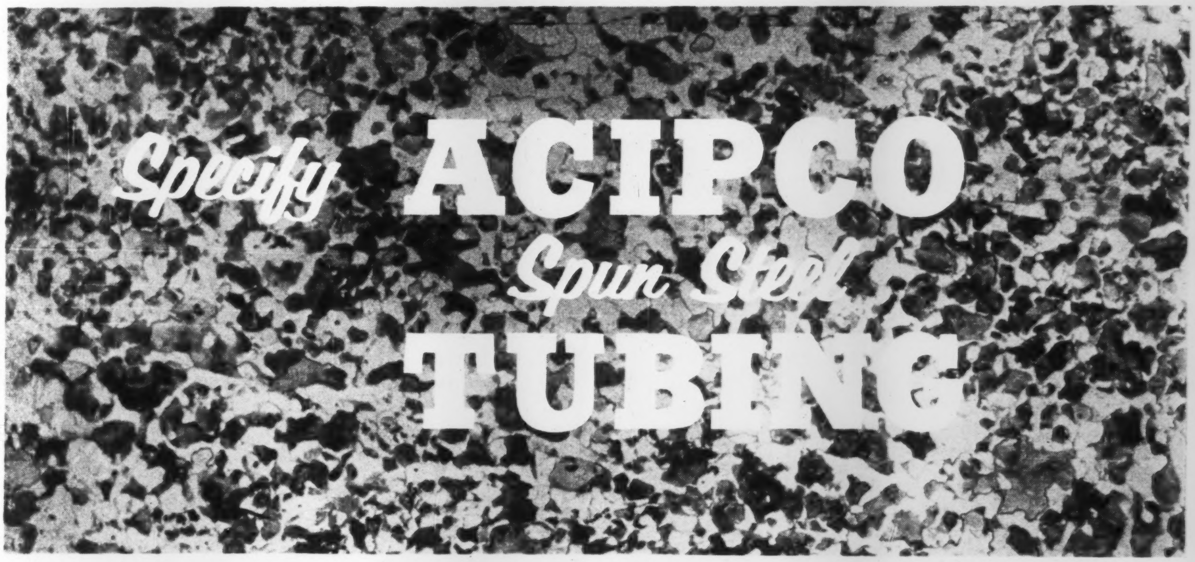
Victor torches were an immediate success—they were designed with the user in mind by L.W. Stettner, a skilled and experienced pioneer welder who knew the needs of the men who work with torches—the design was so efficient and well thought out that few changes have been made since that time.

Victor safety regulators were created in the same pattern—to fill the need for safe, reliable, and practical equipment for the man in the field.

the success and popularity of Victor today is solidly based on the application of those principles under active leadership of the original inventor and founder.

VICTOR
for welding

VICTOR EQUIPMENT COMPANY *SAN FRANCISCO LOS ANGELES CHICAGO*



CARBON · ALLOY · STAINLESS
CAST IRON · NI-RESIST
ASTM AMS ABS ACI AISI

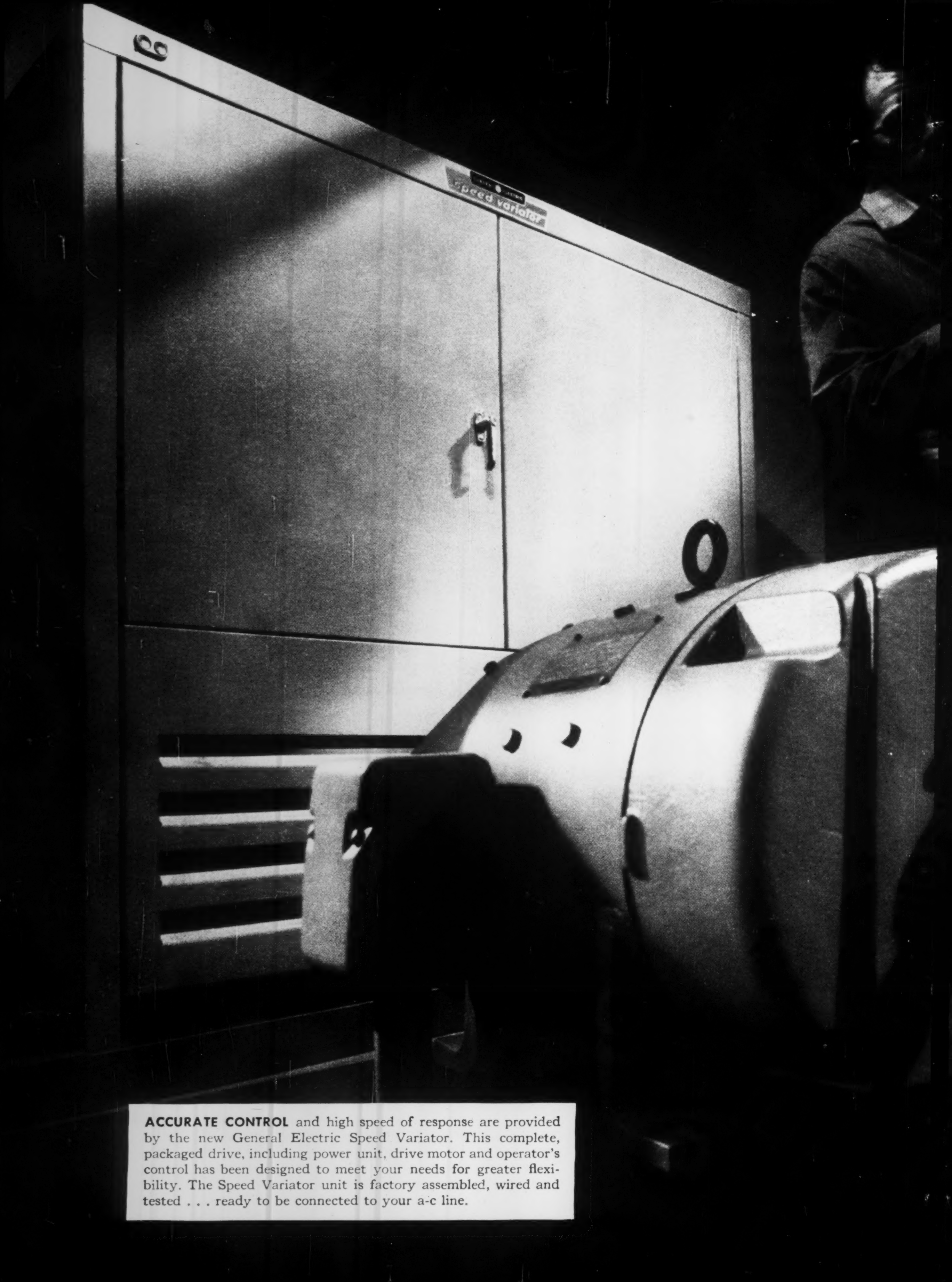
RANGE OF SIZES: 2¼" to 50" O. D.; ⅜" to 4" Wall; Lengths to 410"

FURNISHED: As-Cast, Rough Machined or Finish Machined

Write Special Products Division, Dept. 210, P.O. Box 2603, Birmingham, Ala., for additional information and descriptive brochure.

SPECIAL PRODUCTS DIVISION
AMERICAN
CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

ACIPCO



ACCURATE CONTROL and high speed of response are provided by the new General Electric Speed Variator. This complete, packaged drive, including power unit, drive motor and operator's control has been designed to meet your needs for greater flexibility. The Speed Variator unit is factory assembled, wired and tested . . . ready to be connected to your a-c line.

NEW

General Electric Speed Variator

An Adjustable-speed Drive
with . . .

- Amplistat® Regulator
- Static Exciter
- Kinamatic* Drive Motors
- Silicon Rectifiers
- Two-Unit, Four-Bearing Motor-Generator Set

*Trademark of General Electric Company

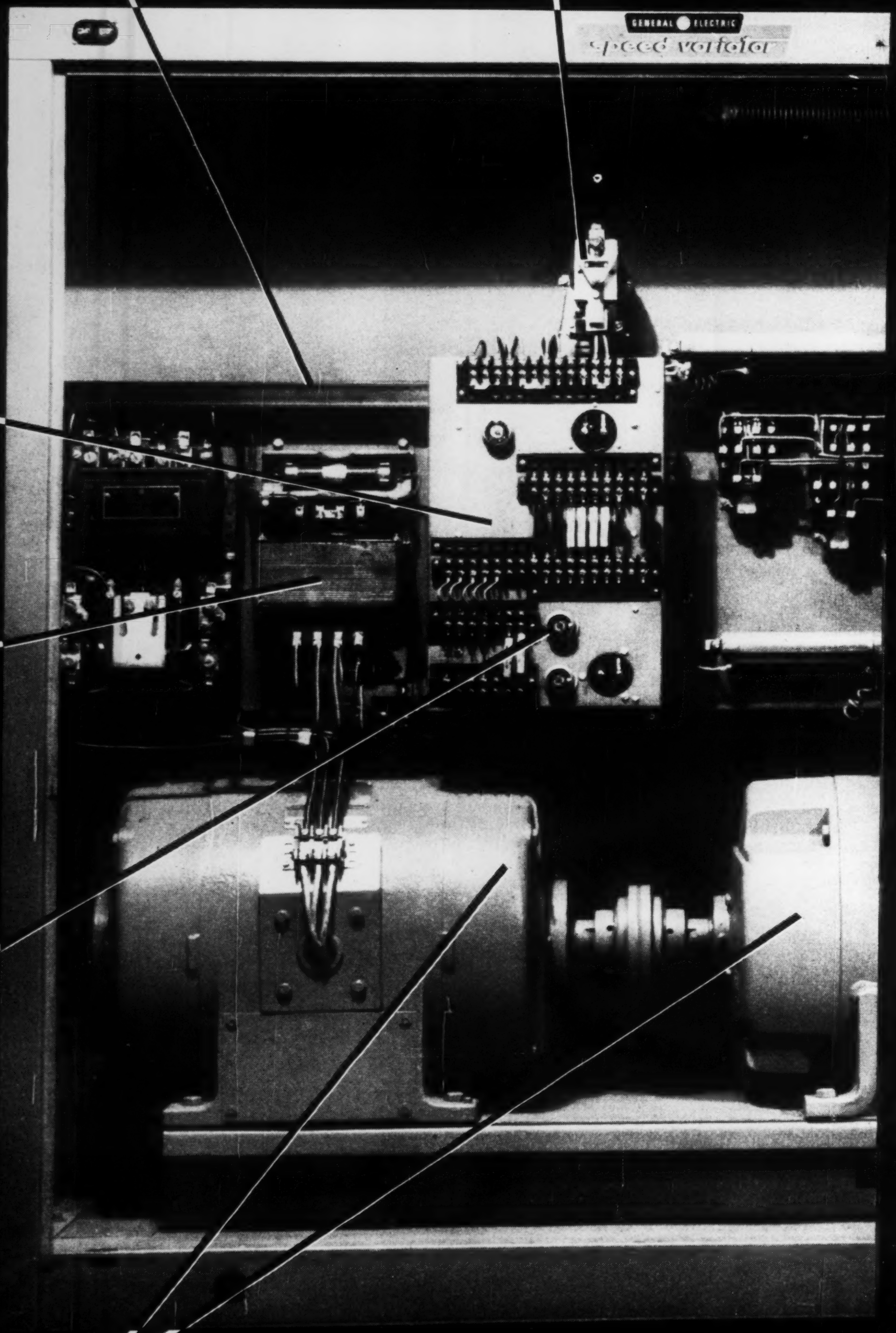
See how the new Speed Variator cuts costs

Progress Is Our Most Important Product

GENERAL ELECTRIC

RECESSED WIRING TROUGHS simplify installation and inspection. Permit back-to-back mounting of control panels when required.

FRONT-CONNECTED CONTROL COMPONENTS make servicing and replacement easy. Standard parts can be replaced from stock.



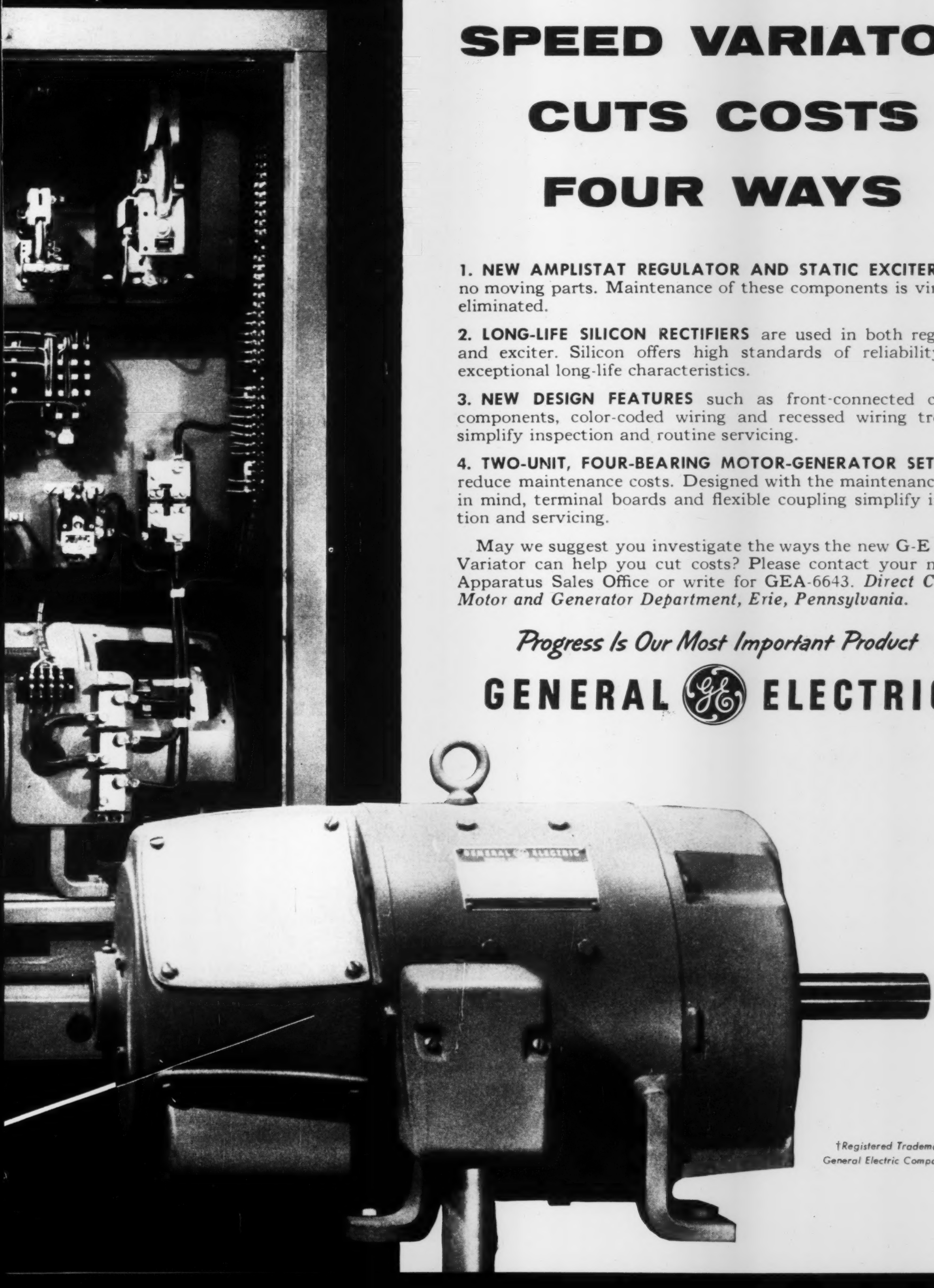
AMPLISTAT REGULATOR is standard equipment on new Speed Variator. It holds speed steady under varying loads . . . has no moving parts.

STATIC EXCITER permits immediate operation because it requires no warm-up time.

TIMED ACCELERATION AND DECELERATION permits smooth, controlled starts by means of simple potentiometer knob adjustment.

TWO-UNIT, FOUR-BEARING MOTOR-GENERATOR SET features latest design Tri-Clad† '55' alternating-current motor and direct-current generator. In ratings 3 through 50 hp, set is mounted on base in which special openings have been provided so that it can be removed by fork truck.

KINAMATIC DRIVE MOTOR can handle greater momentary loads. It provides split-second response to control signals; more power per pound and 100% longer motor life.



NEW

SPEED VARIATOR CUTS COSTS FOUR WAYS

1. **NEW AMPLISTAT REGULATOR AND STATIC EXCITER** have no moving parts. Maintenance of these components is virtually eliminated.

2. **LONG-LIFE SILICON RECTIFIERS** are used in both regulator and exciter. Silicon offers high standards of reliability and exceptional long-life characteristics.

3. **NEW DESIGN FEATURES** such as front-connected control components, color-coded wiring and recessed wiring troughs, simplify inspection and routine servicing.

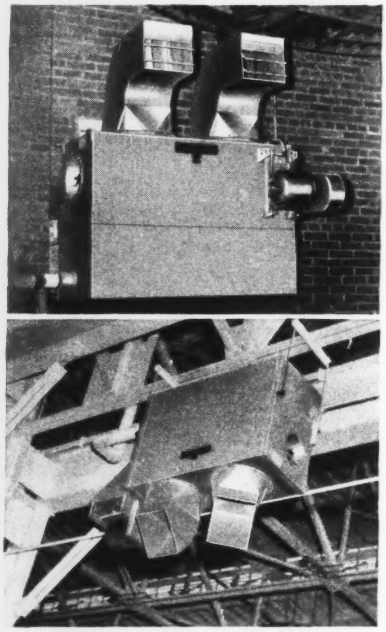
4. **TWO-UNIT, FOUR-BEARING MOTOR-GENERATOR SET** helps reduce maintenance costs. Designed with the maintenance man in mind, terminal boards and flexible coupling simplify inspection and servicing.

May we suggest you investigate the ways the new G-E Speed Variator can help you cut costs? Please contact your nearest Apparatus Sales Office or write for GEA-6643. *Direct Current Motor and Generator Department, Erie, Pennsylvania.* 813-14

Progress Is Our Most Important Product

GENERAL ELECTRIC

†Registered Trademark
General Electric Company



At top, conserving productive space in low-ceiling area with a compact "Buffalo" Highboy Unit Heater.

Check the floor space-saving advantages of ceiling-suspended "Buffalo" Lowboy Unit Heater in lower photo.

MAINTENANCE-FREE

"BUFFALO" PACKAGE UNIT HEATERS

INSURANCE AGAINST LEAKAGE IN HIGH-PRESSURE STEAM SYSTEMS

For flexible, economical, efficient "spot-heating" applications, "Buffalo" Breezo-Fin Unit Heaters are doing an outstanding job in plants of every type. The unique design of Breezo-Fin Unit Heaters makes them ideally suited for use in high-pressure steam systems. *There is no possibility of leakage inside the unit.* The one-piece, seamless copper coil runs continuously from inlet to outlet ground joint. This "Buffalo" feature insures you of a positive, leak-tight heating unit for steam pressures up to 250 lbs.

"Buffalo" Breezo-Fin Quality Features:

- **Fins spaced for maximum radiation.**
- **Adjustable louvers aim heat where needed.**
- **Streamlined, attractive appearance.**
- **High-efficiency fans give quiet operation.**
- **One-piece welded motor mounting.**
- **Rugged construction for trouble-free life.**
- **Side connections for compact, low headroom installation.**

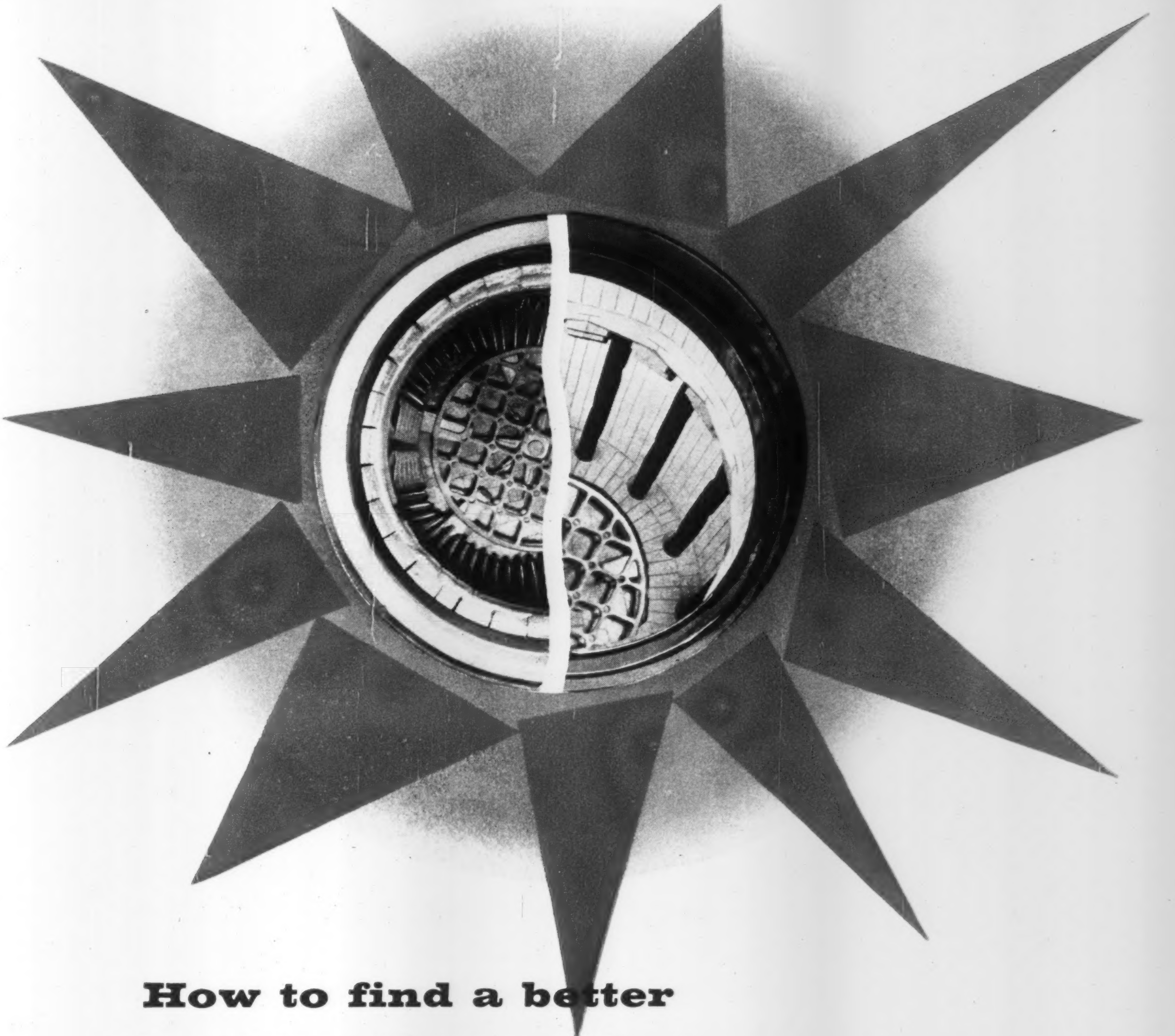
"Buffalo" Breezo-Fin Unit Heaters may be the economical, *leak-proof* solution to *your* high-pressure "spot-heating" problems. Write today for Bulletin 3137-E.

For heating larger plant areas efficiently and economically, dependable "Buffalo" Lowboy and Highboy unit heaters can save space in your plant. See photos above, and write us for Bulletin 3704.

BUFFALO FORGE COMPANY
BUFFALO, NEW YORK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

VENTILATING   AIR CLEANING   AIR TEMPERING   INDUCED DRAFT   EXHAUSTING   FORCED DRAFT   COOLING   HEATING   PRESSURE BLOWING



How to find a better heat-treating method

Here's a sound way to do it. Take your problems to the people who have consistently, over the years, provided the metal treating industry with new and better ideas, more efficient, more practical equipment. This will bring you to Lindberg, creators of the famous Cyclone type atmosphere furnaces, the long-life "dimple" vertical radiant tube, the revolutionary new CORRTHERM electric heating element and so many other innovations in better heat treating methods. Lindberg is synonymous with heat treating furnaces. We build them for carbonitriding, carburizing, hardening, tempering, normalizing, bright stainless annealing, brazing, carbon correction, nitriding, or any other metal treating requirement. Give your production processes the advantages of Lindberg's forward look in "heat for industry" techniques. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write Heat Treating Furnace Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Illinois.

LINDBERG heat for industry

What has changed?

The automobiles of today are certainly different than the models shown in this photo of downtown Chicago. Many other things have also changed since this picture was taken.

One thing that remains unchanged — as it has for the past 36 years — is the remarkable spirit of service that has guided THE CHICAGO CONCRETE BREAKING COMPANY (recently re-named THE EDWARD GRAY CORPORATION) to its commanding position in modern demolition and construction. Here is skilled know-how and experience . . . designed to save you both considerable down-time and money on your emergency repairs, rehabilitation of present facilities, or new construction.

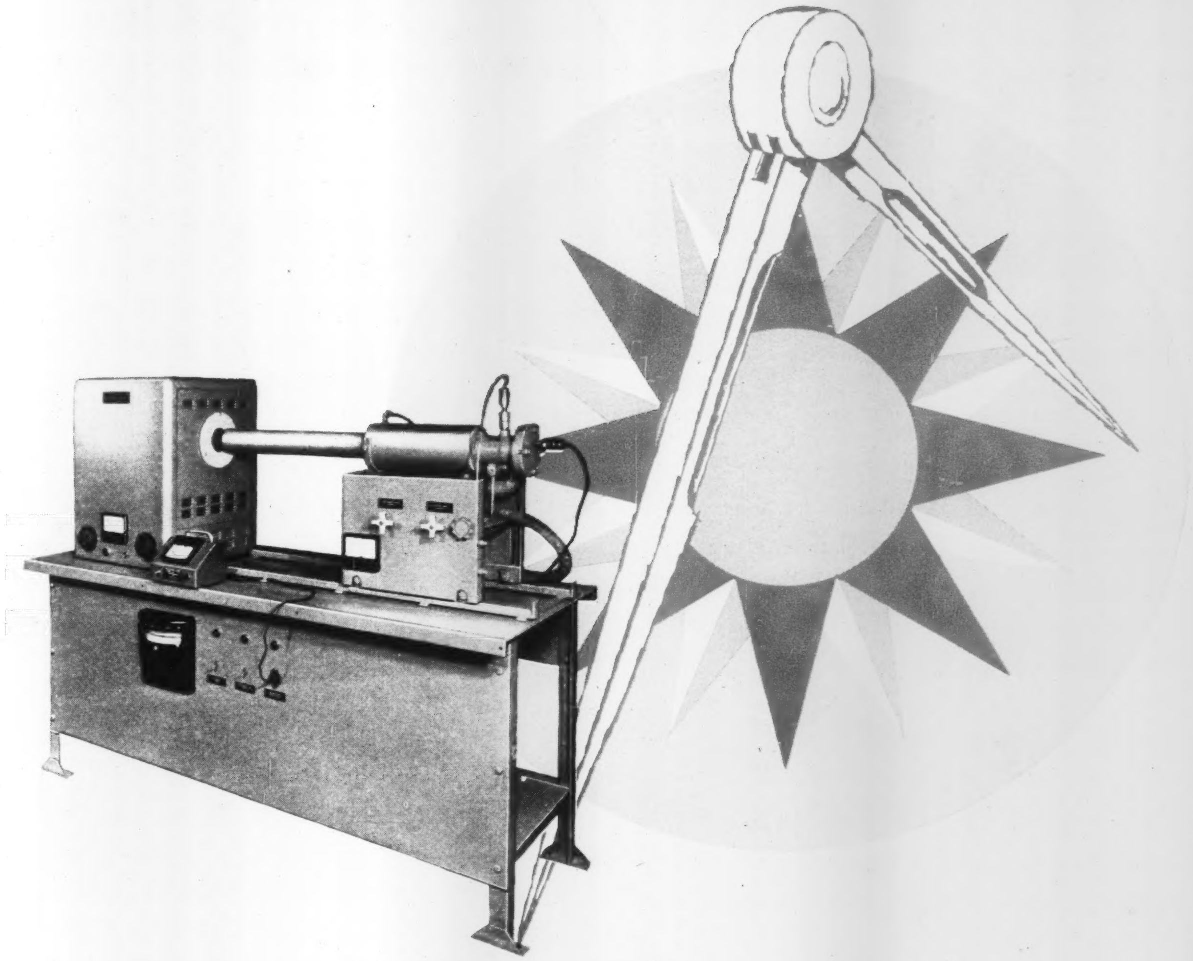
THE EDWARD GRAY CORPORATION offers complete design, engineering and construction service for all your needs, whether the job is small and easy, or large and complex. We welcome all inquiries by saying, as we have for 36 years,

"WANTED! A HARD JOB"

General Offices:
12233 AVENUE "O", CHICAGO 33, ILL.
TELEPHONE BAYPORT 1-8400

THE EDWARD
GRAY
CORPORATION
FORMERLY CHICAGO CONCRETE BREAKING CO.

Eastern Offices:
213 COREY AVENUE, BRADDOCK, PA.
TELEPHONE ELECTRIC 1-1656



Pilot Plant Equipment . . .
a Lindberg Innovation

When there is something new in "heat for industry" most often it comes from Lindberg. The latest is a new line of Lindberg equipment now available that fills in a long-felt need in metal treating. Our engineers have designed a brand new group of furnaces to bridge the gap between laboratory and production line. This larger-than-lab, smaller-than-standard equipment is designed specifically for pilot plant use. You can test your materials, your methods, on equipment moderately priced but production capable. Fuel-fired, electric and High Frequency units are included. Six different types of furnaces can be supplied including, as illustrated, an electric vacuum-type furnace ideal for testing this newest and most promising heat treating method. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write Pilot Plant Equipment Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Illinois.

LINDBERG heat for industry

Cleveland adds the NYLOK self-locking feature to its complete line of socket screw products

SELF-LOCKING MINIATURE CAP AND SET SCREWS AVAILABLE IN ALL STANDARD DIAMETERS FROM SIZE #0

Cleveland Nylok* socket screws are self-locking—won't work loose. The locking device is a tough, resilient nylon pellet that forces the mating threads firmly together. All auxiliary locking devices are eliminated. Seated or unseated, these screws lock wherever wrenching stops. Because of "plastic memory," the pellets tend to recover their original shape, and screws can be used repeatedly.

These self-locking screws will not gall or damage threads or seating surfaces even when used with soft or die cast materials. The set screws can be used with hardened shafts, since they lock against the threads of the tapped holes. Cleveland Nylok screws are not affected by aging or by temperatures from −70° to +250° F.

Save on production time by using Cleveland Nylok self-locking socket screws. By eliminating auxiliary locking devices, you simplify design and reduce the size and weight of components, as well as your fastener inventory. Write today for literature and prices.

*T. M. Reg. U.S. Pat. Off., The Nylok Corporation

Only Cleveland can supply both hexagon head cap screws and socket screw products with the Nylok self-locking feature — from stock

CLEVELAND SELF-LOCKING SOCKET SCREW PRODUCTS

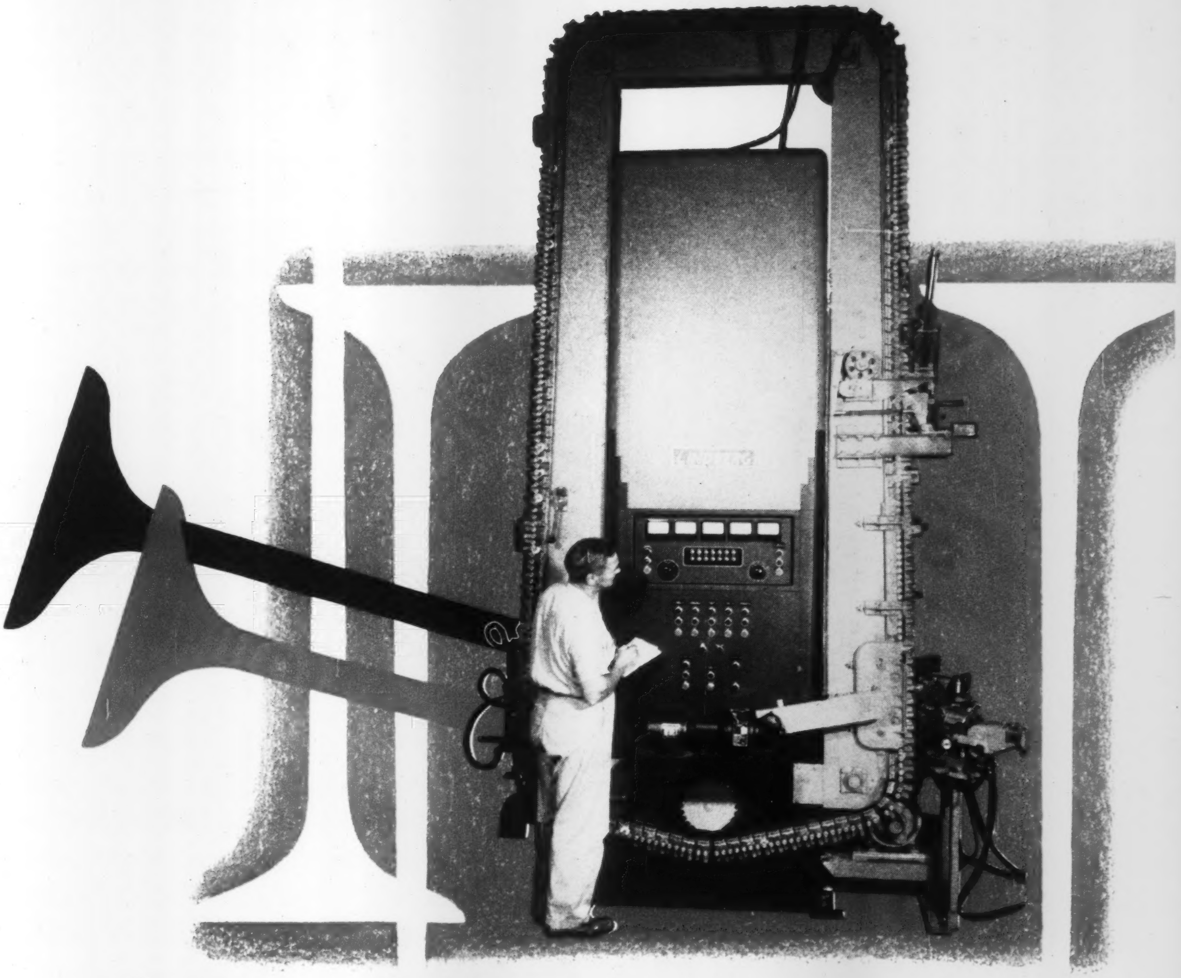
UNIFIED THREADS — CLASS 3A FIT

Type	Standard Sizes (diam.)	Material
Socket head cap screws	#0 to 1 in. (larger sizes avail.)	Alloy steel, heat treated or Nonmagnetic 18-8 stainless
Set screws (cup, half dog, flat, cone or oval points)	#0 to 1 in. (#0-#3, cup point only)	Alloy steel, heat treated or Nonmagnetic 18-8 stainless (to ½ in., cup point only)
Flat head socket cap screws	#4 to ¾ in.	Alloy steel, heat treated
Button head socket cap screws	#4 to ⅝ in.	same
Shoulder screws (stripper bolts)	¼ to ¾ in.	same
N.P.T.F. (Dryseal) pressure plugs	1/16 to 1¼ in.	same

One alloy steel socket screw key is supplied in each standard package of Cleveland self-locking screws; also in bulk and as sets in key folds.

THE CLEVELAND CAP SCREW COMPANY 4444-2 Lee Road, Cleveland 28, Ohio

WAREHOUSES: Chicago • Philadelphia • New York • Los Angeles

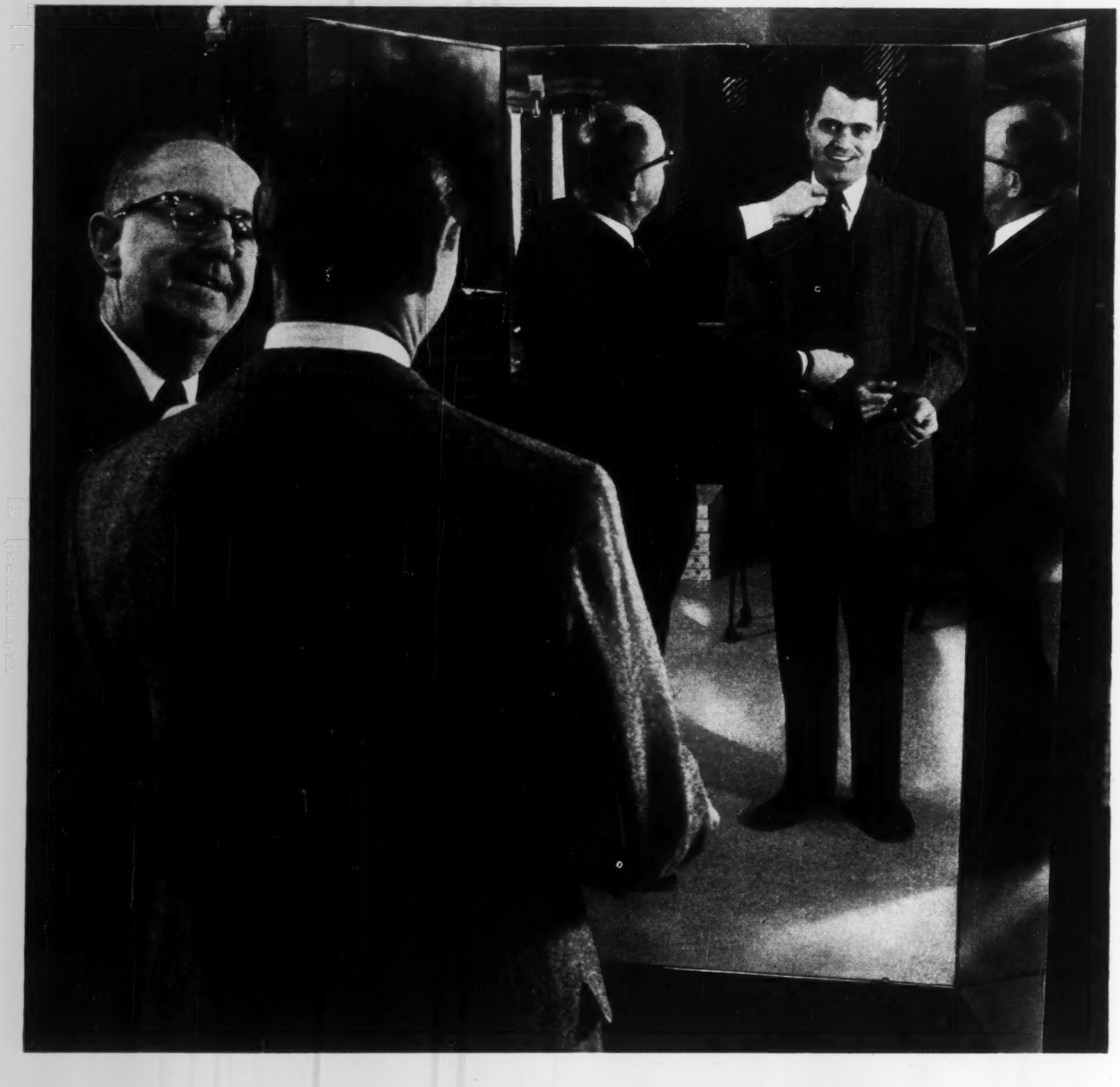


Lindberg pioneers in High Frequency Heating

Along with its pioneering in all phases of "heat for industry" Lindberg is one of the largest makers of High Frequency heating units. Our "H-F" designers and engineers have made outstanding developments in this important heat treating field. For example, we illustrate a remarkable unit just recently completed for aluminizing automotive valves. It was designed vertically, saving 60% of floor space, and is completely automatic. No operator is required. It fits perfectly into an automated production line.

Our High Frequency Division provides units for hardening, brazing, heating for forging and forming, annealing and many other processes, and designs a variety of fixtures for application to "H-F" units. Lindberg also supplies a complete line of motor generators for all induction heating and melting applications. Get in touch with your nearest Lindberg Field Representative (See classified phone book) or write High Frequency Division, Lindberg Engineering Company, 2441 W. Hubbard St., Chicago 12, Illinois.

LINDBERG heat for industry



Choose the combination that's just right for you

. . . in a Bristol Brass Alloy for your Product

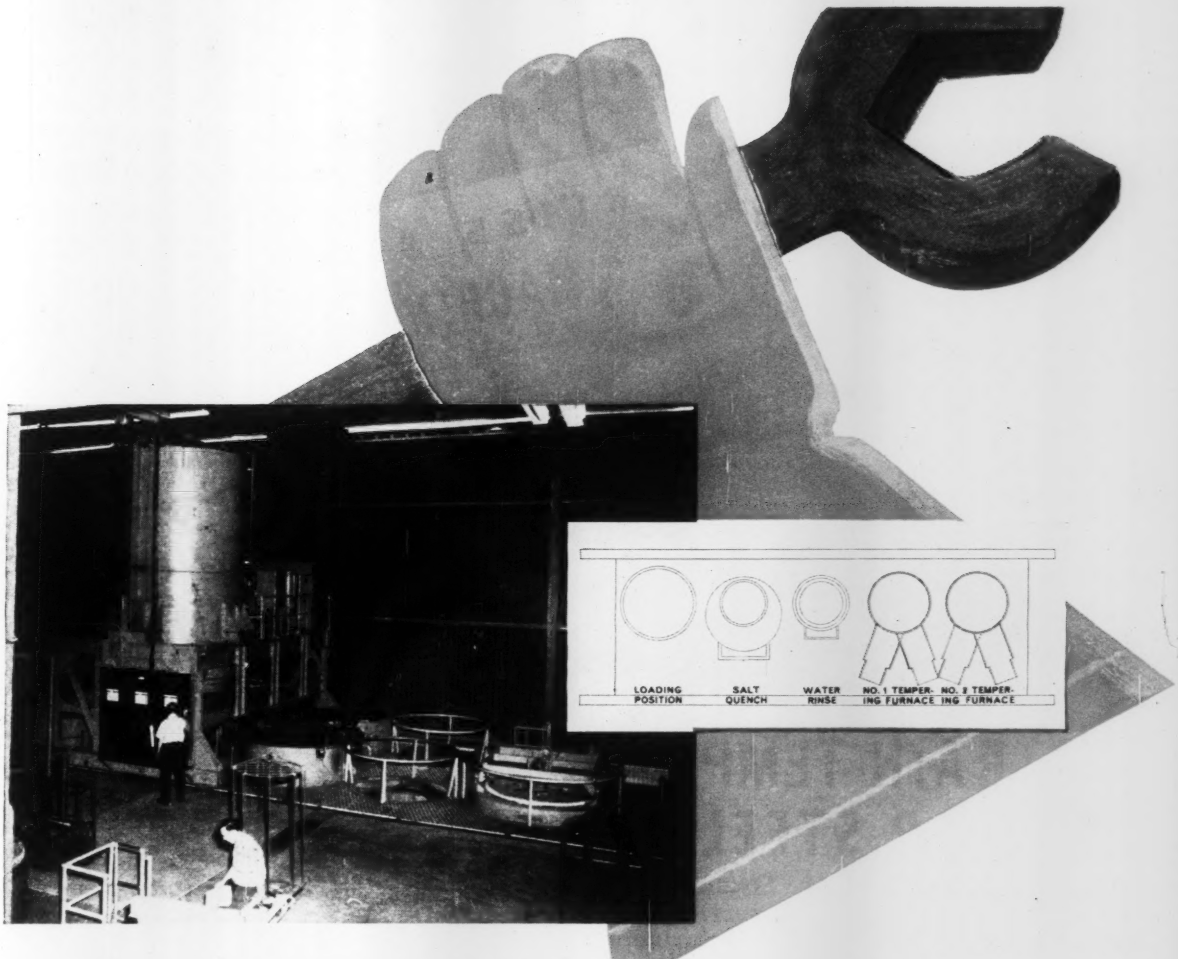
A *harmonious* combination . . . one that's exactly suited to your manufacturing, marketing, and even your *color* requirements . . . that's what you get in Bristol Brass. For here, past masters of the art of Brass blending never stop trying to adjust the original specifications of every customer's alloy more closely to its use. Net result — you get a Brass that bears your own special trademark, *but at the standard price.*

And speaking of price, it's been years since the unmatched advantages of Brass could be bought at such attractive levels as today's. *So get on the solid Brass standard.* Let us show you what Bristol Brass strip, rod and wire can do to give *your* product a lift, both in manufacturing and sales. Call Ludlow 2-3161, and ask for a sales engineer.

The **BRISTOL BRASS**
CORPORATION

Since 1850, makers of Brass strip, rod and wire in Bristol, Conn. (Now also the home of ACCURATE BRASS CORP. (Subsidiary), producers of Fine Forgings.)

Bristol Brass has offices and warehouses in Boston, Buffalo, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, Syracuse.

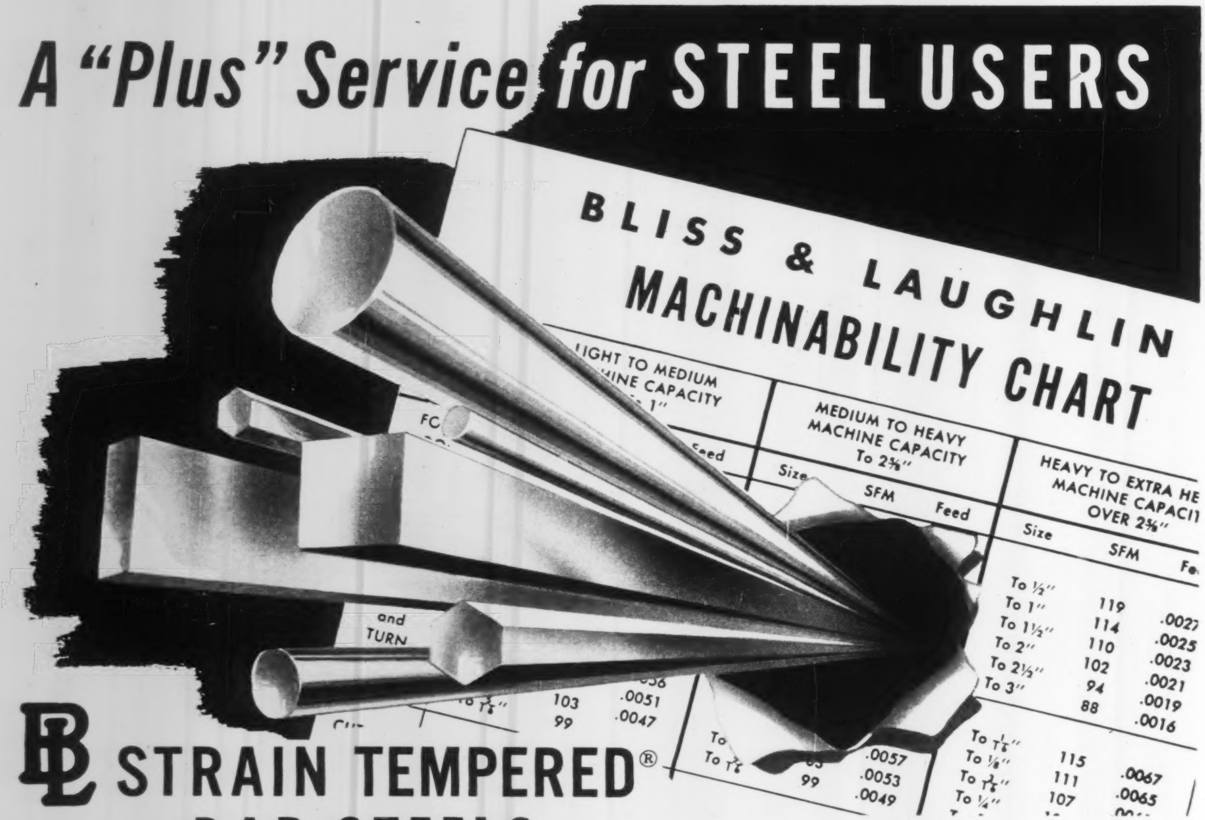


Lindberg applies the creative touch to field-installation

Here is an example of Lindberg's creative touch in field-installed heat treating equipment. Our unique design of this movable overhead furnace saved space, labor and time and increased quality and operating efficiency in missile manufacturing. We have the technical staff and the experienced engineers to design and install for you any requirement you may have for the application of heat to industry. Our service covers all types of heat treating furnaces, aluminum melting and holding furnaces, high frequency units, ceramic kilns, controls and all facilities required to fit this equipment into your production processes. We specialize in "turn-key" operations covering everything from design and engineering to the finished job installed in your own plant. Whatever your industrial heating problem, a good way to solve it is to talk it over with Lindberg. Just get in touch with your local Lindberg Field Representative (See classified phone book) or write Lindberg Industrial Corporation, 2321 West Hubbard St., Chicago 12, Illinois. Los Angeles Plant: 11937 S. Regentview Avenue, at Downey, California.

LINDBERG heat for industry

A "Plus" Service for STEEL USERS


BLISS & LAUGHLIN
MACHINABILITY CHART
LIGHT TO MEDIUM MACHINE CAPACITY To 1"
MEDIUM TO HEAVY MACHINE CAPACITY To 2⅜"
HEAVY TO EXTRA HEAVY MACHINE CAPACITY OVER 2⅜"
Size SFM Feed
To ½" To 1" 119 .0027
To 1½" 114 .0025
To 2" 110 .0023
To 2½" 102 .0021
To 3" 94 .0019
88 .0016
To 1/16" 115 .0067
To ⅛" 111 .0065
To 3/16" 107
To ¼"
103 .0051
99 .0047
.0057
99 .0053
.0049
and TURN

BL STRAIN TEMPERED®
BAR STEELS . . .

tailored to your order with *Certified Analysis and Machinability Tests*

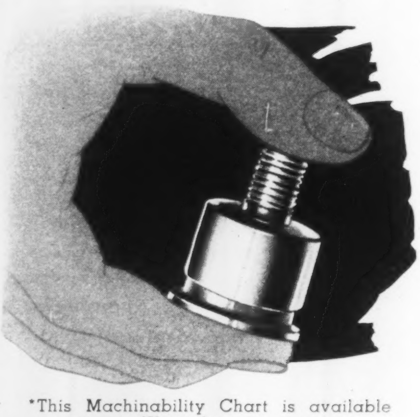
WHEN you order C-1144 Strain-Tempered Steel, you get two important services, which are extra advantages offered exclusively by Bliss & Laughlin, Inc.

First: You receive a notarized Certificate of Analysis that assures the steel has met B&L quality standards of chemical composition, strength and hardness.

Second:—You are furnished with a machined test part (from your lot of steel) produced on an automatic bar machine in our own laboratory at the speeds and feeds recommended on the B&L Machinability Chart.*

This test information will serve as a guide in working out your own machining setup, and will help you to obtain maximum results in fabricating B&L Strain-Tempered Steels.

Write for Bulletin #58



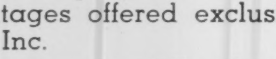
*This Machinability Chart is available on request. Write for your copy.

BLISS & LAUGHLIN, INC.

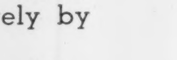
GENERAL OFFICES: HARVEY, ILLINOIS

SALES OFFICES IN ALL PRINCIPAL CITIES

FOUR PLANTS:—



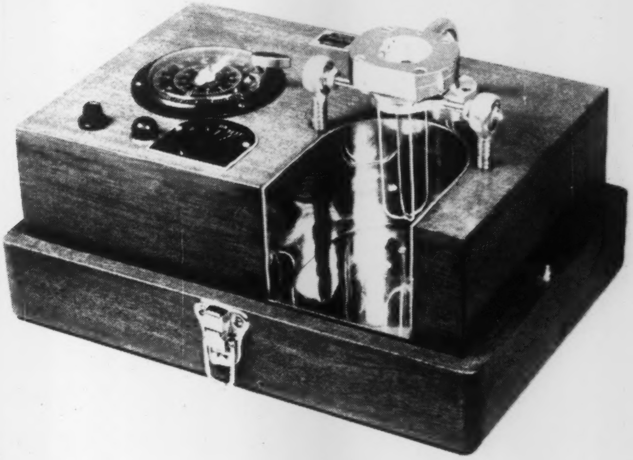
HARVEY, ILL.



DETROIT, MICH.

BUFFALO, N. Y.

MANSFIELD, MASS.



THE QUENCHING SPEED TO MEET YOUR NEED

. . . Proved by this New Testing Method

Perhaps you don't always need a really fast quenching oil. But when you do . . . Houghton has it . . . as proved by the new Magnetic Quenchometer developed by General Motors Technical Center.

This new, accurate test clearly proves HOUGHTO-QUENCH "K" is the fastest quenching oil on the market today . . . the best and safest quench you can buy for getting maximum hardness in lean alloy steels.

The test uses a pure nickel ball, heated beyond the temperature at which it is entirely non-magnetic (1,625°). The heated ball drops into a container holding 200 cc. of the quench being tested, starting a timer the exact instant it enters the quenching bath.

At the exact instant the nickel ball has cooled to the temperature at which it regains its magnetic properties (Curie point, approximately 670°), it is drawn to a magnet. This action shuts off the timer.

The Magnetic Quenchometer has disclosed much useful data on the excellence of the various types of HOUGHTO-QUENCH and the other Houghton Quenching Oils as well.

It's a good idea to ask the Houghton Man about Quenching the next time he calls on your plant. If you need speed, he'll show you how to get it with HOUGHTO-QUENCH, the fastest quench this side of water. Or, if speed is not your prime requirement, he can recommend from a variety of Houghton oils the one best suited to your needs.

Why not make Houghton your heat treating headquarters? Call the Houghton Man today, or write direct to E.F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

HOUGHTO-QUENCH IS DIFFERENT

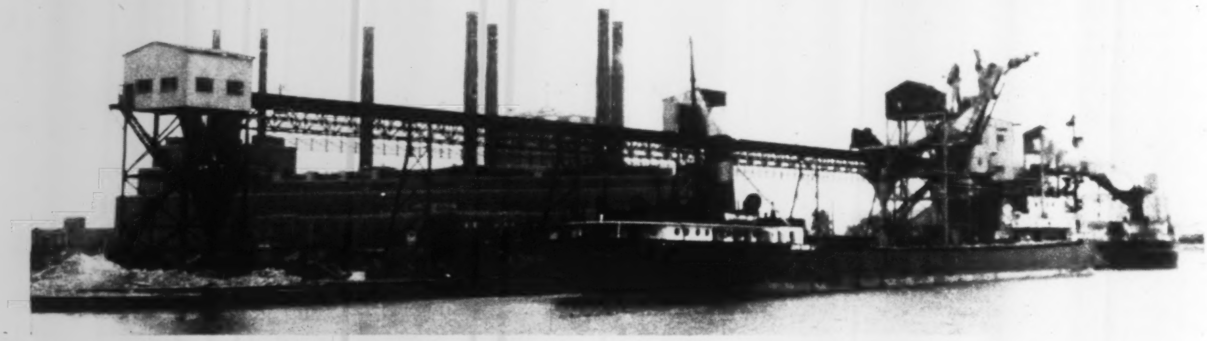
. . . a product of

E.F. HOUGHTON & CO.

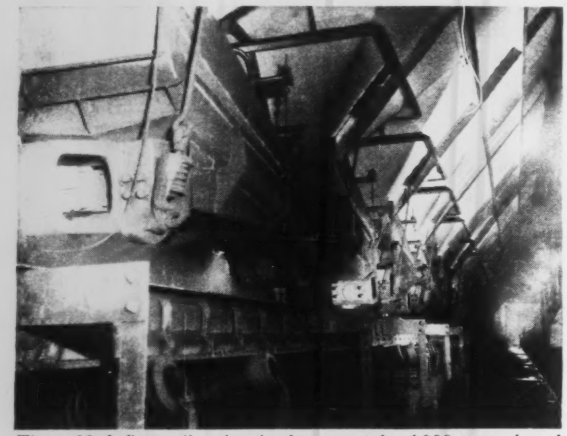
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Coal moves fast from railroad cars to ships at this transfer dock.



Rapid handling improves competitive position of 29 participating coal companies



These 20 Jeffrey vibrating feeders can take 4,000 tons of coal per hour from hoppers under car shake-outs. Electronic controls vary the feed to assure a uniform rate of flow to the 72-inch conveyor belt that carries the coal to boat loading telescopic chutes.

COAL is transferred quickly, economically, from railroad cars to ships here at Rail-to-Water Corporation's Chicago docks. This permits the 29 Midwestern coal companies who are partners in this enterprise to sell their coal on the Great Lakes.

Typical equipment contributing to the speed which spells economy is this line of 20 Jeffrey electric vibrating feeders. They keep coal on the move with a minimum of attention, saving manpower. Vibrations are timed to their natural mechanical frequency, insuring minimum use of power and quiet, trouble-free operation. No wearing of parts, so maintenance costs and downtime are low.

Catalog 870 describes Jeffrey vibrating feeders. The Jeffrey Manufacturing Company, 889 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT... TRANSMISSION MACHINERY... CONTRACT MANUFACTURING

it's easy
to recognize
superior
quality
brass and
aluminum
bearing this
trademark
identification

made better
to bring out the
best in your
fabricated products

SCOVILL

SCOVILL MANUFACTURING COMPANY
MILL PRODUCTS DIVISION
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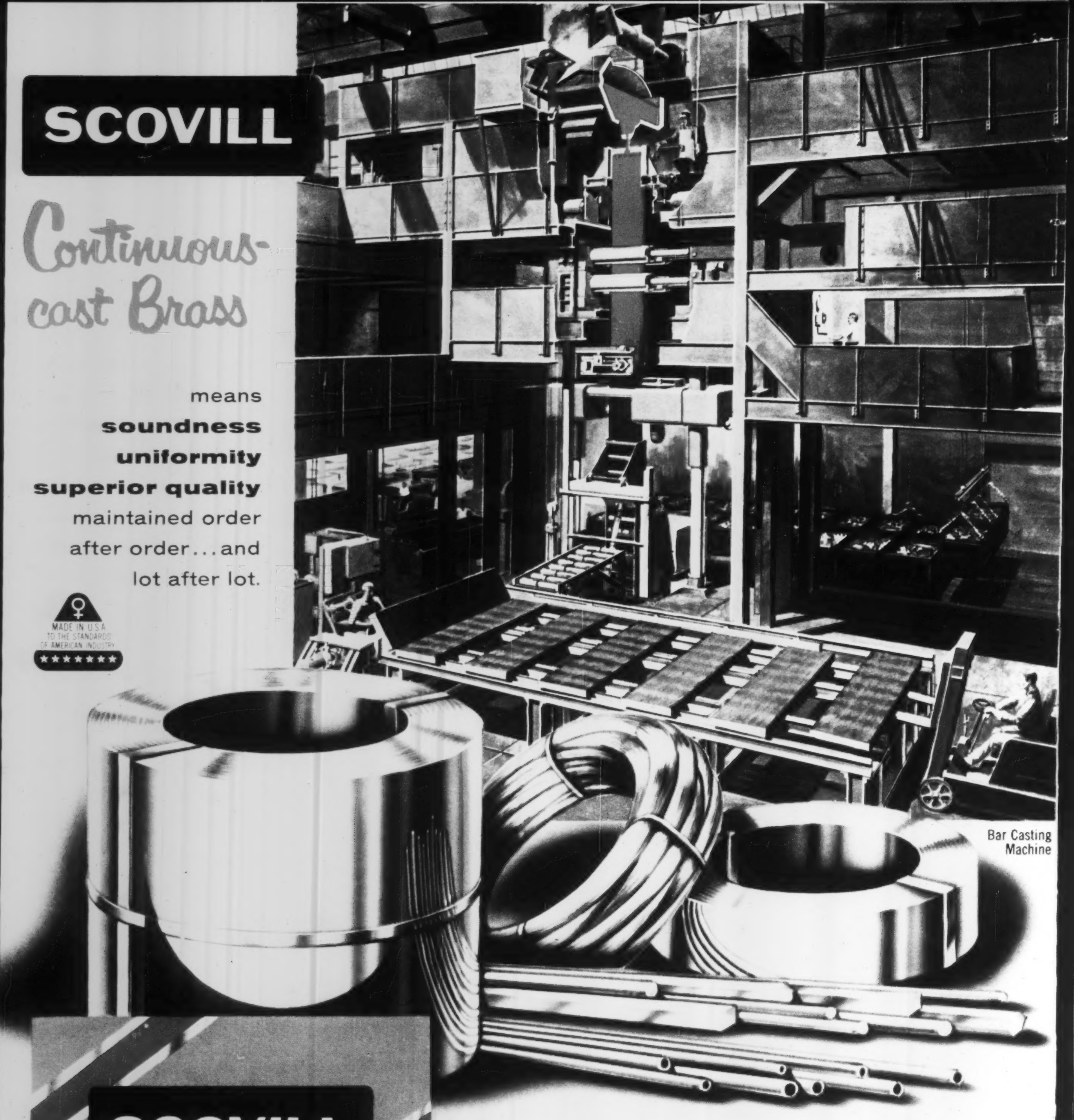

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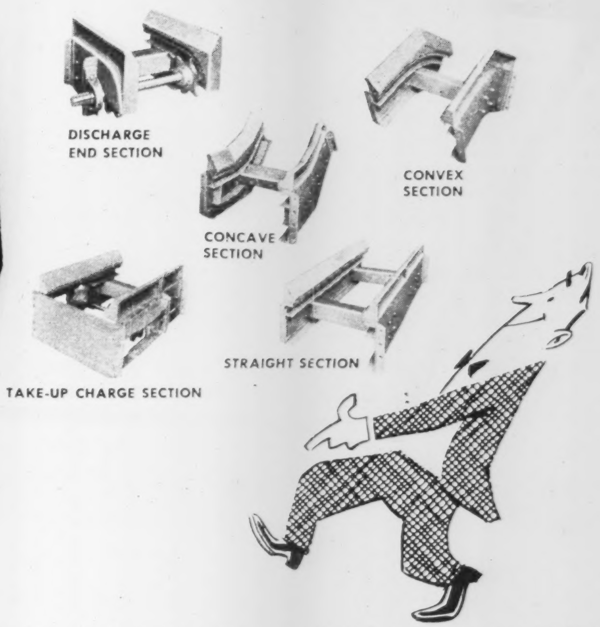
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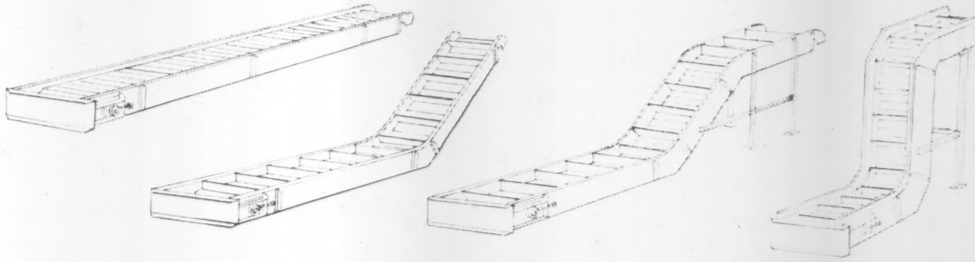

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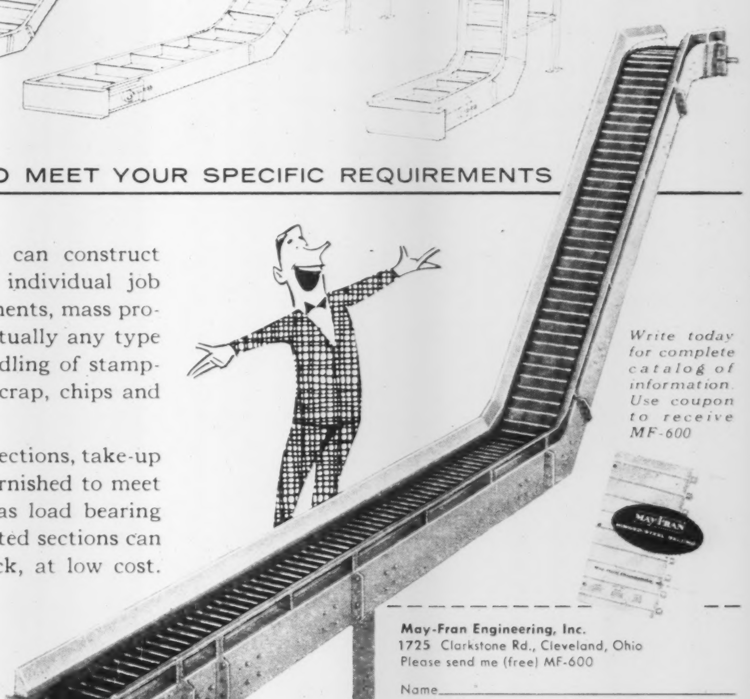
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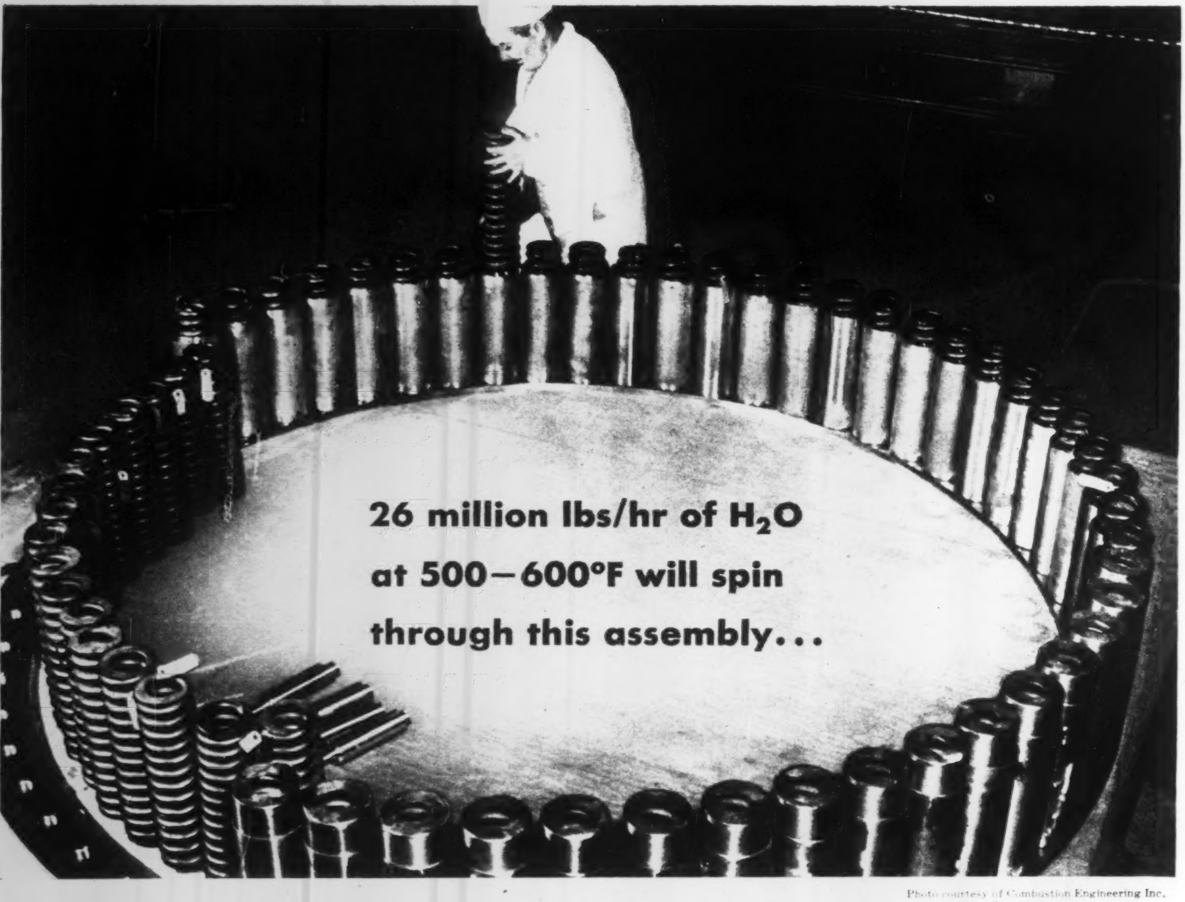
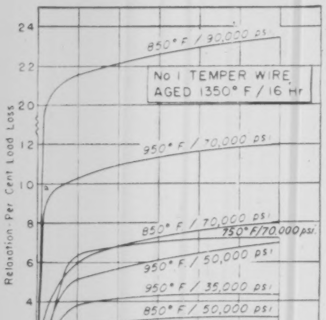


Photo courtesy of Combustion Engineering Inc.

How Inconel "X" is used in Shippingport reactor to make sure core mount springs stand up

Superheated high-purity water makes many ordinary spring materials relax quickly. It may cause them to fail by stress-corrosion cracking or embrittlement.



Relaxation of Inconel "X" springs made from No. 1 temper wire.

An outstanding exception is Inconel "X"* age-hardenable nickel-chromium alloy. Springs of this alloy resist both corrosion and heat . . . up to 1100°F in certain applications.

Here are some relaxation curves, for example, which show what stresses Inconel "X" alloy is capable of handling at various temperature levels.

The curves speak for Inconel "X" alloy. When you want springs that resist relaxation at high temperatures this is the alloy to use . . . just as Combustion Engineering Inc. has done in spring mounting the core of this reactor, for a plant designed by Westinghouse Electric Corp. for operation by Duquesne Light Co.

Inconel "X" gives you valuable bonus properties too

Inconel "X" alloy also offers you (1) excellent corrosion resistance (2) outstanding hardness and wear resistance (3) high fatigue strength (4) high tensile strength (5) low thermal expansion (6) resistance to stress-corrosion cracking.

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INCO NICKEL ALLOYS

STEEL

January 6, 1958

Metalworking Outlook

Business Climate for 1958

In 1958, metalworking will continue to bear the brunt of a mild economic dip that started in 1957's third quarter. Gross national product, though, will climb slightly to about $445 billion in the next 12 months, compared with the expected $435 billion total in the last 12 months. Slight inflation and high volume in soft goods and services will account for the gain. Look for a 1 or 2 per cent price rise in metalworking products throughout the year, dictated by higher labor costs. Despite the boost, profits will continue to be subjected to their long term erosion. New plant and equipment expenditures will drop in 1958—perhaps as low as $30 billion, but certainly as low as $33 billion. In peak 1957, the figure was $37 billion.

Turning Point in Capital Spending

The decline in capital equipment spending is the major soft spot in the year ahead. After an unprecedented expansion program that has continued almost unabated since the end of World War II, we at last have plenty of capacity for current needs. We're in a resting period now, waiting for population pressures to force another boom, probably in the early 1960s. Military spending might speed the boom up, but not this year. Federal spending for defense will reach about $38.4 billion in the fiscal year ending next June 30. Fiscal 1959's defense spending won't go much over $40 billion, substantially under the 10 per cent of the GNP for defense that we have experienced in many of the years since World War II.

Consumer Outlays Mediocre

Nor can we count on a marked upturn in consumer spending for hard goods in 1958 to spark dramatic metalworking improvements. Such expenditures won't be low, just mediocre by present standards. So, it will be difficult for total metalworking sales in 1958 to match the $140-billion level reached in 1957. Steel ingot production should reach 111 million tons, compared with 113 million in the last 12 months. The first half for metalworking will be at a slower pace than the second. We'll have more time lost due to strikes in 1958 than in 1957. The big trouble spot is autos where a stoppage may start on June 1.

Industry-by-Industry Prospects

Steel-consuming industries should fare about this way:

CONSTRUCTION—Dollar volume should reach $49 billion in 1958, compared with $47.4 billion in 1957 and $46.1 billion in 1956. Highway building will jump by 10 per cent in the next 12 months, and other public construction will rise, too—schools, utilities, hospitals. Housing starts should exceed 1.1 million in 1958, compared with only slightly more than

Forum on Technical Progress—Page 209

1 million in 1957. But private industrial and commercial building will drop by about 10 per cent.

AUTOMOBILES—Look for production of 6. million cars and 1.05 million trucks in 1958, compared with 6.15 million cars and 1.08 million trucks in 1957. The heaviest output will be in the first five months. Labor contracts with the Big 3 expire on June 1, so the industry will assemble as many units as possible before that date. Even if there's no strike, labor costs will be higher in the last seven months. Odds favor a walkout, probably against General Motors Corp.

TRANSPORTATION EQUIPMENT—The boom-and-bust freight car business is due for a slump in 1958—about 75,000 cars will be produced, compared with 101,500 in 1957. Railroad capital spending will hit $1.4 billion in the next 12 months, equaling the performance of the last 12. Both Naval and commercial shipbuilding are on the rise, but they are still a minor factor in the economy. Civilian aircraft production—about 100 transports and 6000 to 7000 smaller planes for the coming year—is also minor. The shift to missiles will bring about a reduction in military aircraft production. Emphasis will be on research next year, so spending for hardware will be up only moderately.

APPLIANCES—Look for production in '58 to be about 10 per cent better than it was in '57, to put the industry's unit volume back to the '56 level. Best sellers: Clothes dryers and washers, dishwashers, electric refrigerators, radios.

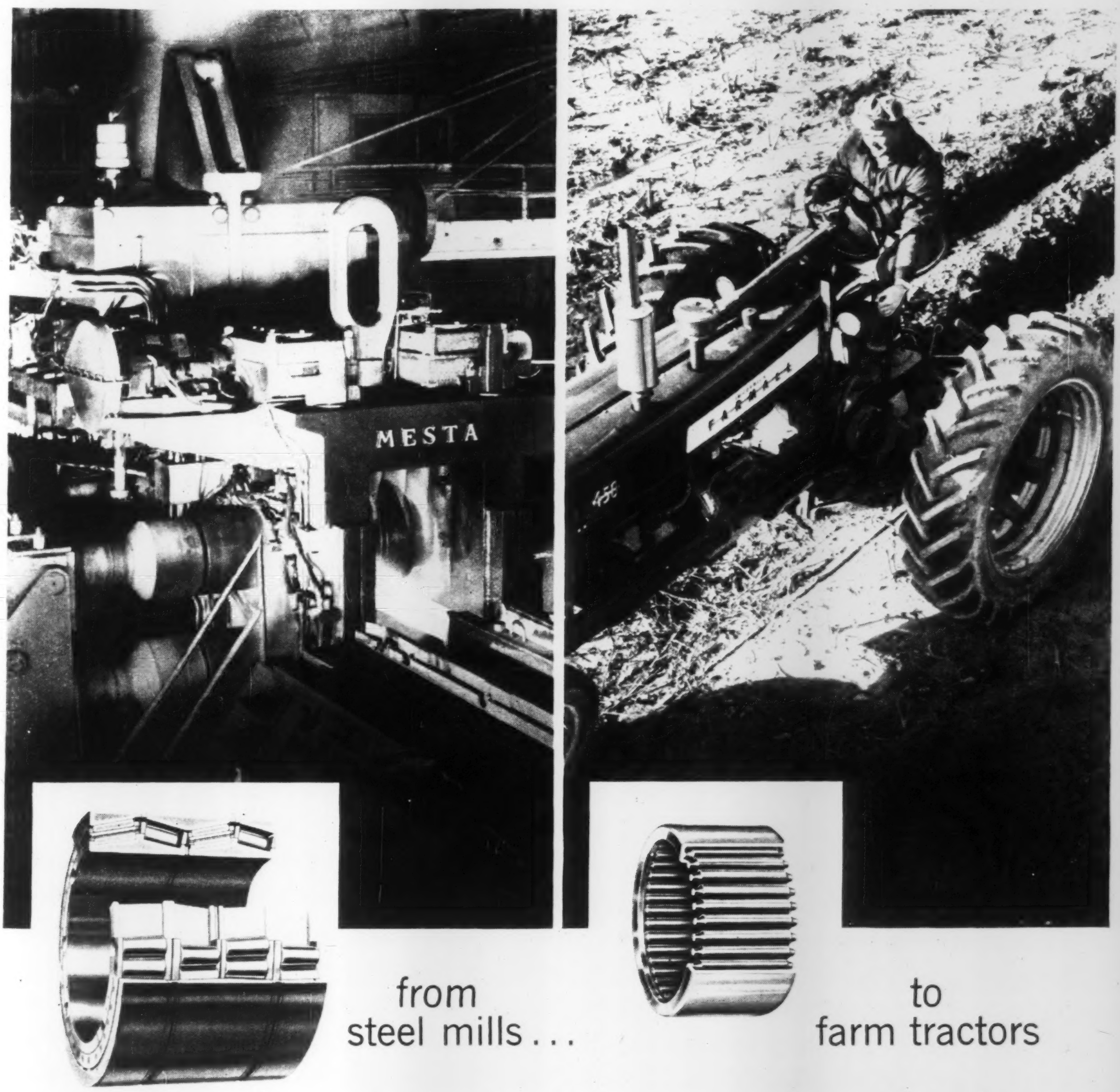
MACHINERY—Shipments in the coming 12 months may be as much as 25 per cent lower than 1957's. This will be the weakest segment in metalworking. Machine tool backlogs now average only about 3.4 months. Builders don't want them to go much lower, so shipments are expected to match new orders in 1958—estimated all the way from $500 million to $700 million. STEEL guesses $600 million. Shipments in 1957 achieved an $845-million level, compared with $886.1 million in 1956. Few other types of machinery will dip as sharply as machine tools, but nearly all will experience declines. One possible exception: Construction machinery. Reason: The road program.

ELECTRICAL MACHINERY—This metalworking segment is more stable because utility commitments are so long range and electronics sales are so high—$8 billion is expected in 1958, compared with $7.2 billion in 1957 and $5.9 billion in 1956.

FARM EQUIPMENT—The slow upturn here will continue in the coming 12 months. The bottom was reached in 1956 with $1.6 billion in sales. The 1957 performance is expected at about $1.75 billion. Farmers will buy still more in 1958, perhaps $1.8 billion. But we'll still not reach 1951 levels when shipments hit $2.3 billion.

OIL AND GAS EQUIPMENT—Production of oil country goods (tubes, pipe, and casing) nearly doubled between 1949 and 1956—rising from 1.4 million to 2.6 million tons. Shipments in the first nine months of 1957 reached 2.3 million tons, but both foreign and domestic demand dropped sharply in the last three months. We have topped out in this metalworking segment, and we will see substantially lower volume in 1958, vs. 1957.

CONTAINERS—A steady 4 per cent growth is likely in the coming year.



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THE EDITOR'S VIEWS **STEEL**

January 6, 1958

Challenges for 1958

The beginning of a new year is a good time to step back and take a realistic look at the problems and challenges ahead.

The setting is somewhat different—but not too different—from that of a year ago.

Many of the problems of prosperity are still with us, including wage-price *inflation, rising costs, and shrinking profits.* But two new elements have entered the picture: 1. The business tempo has slowed down temporarily. 2. The nation's technological complacency has been shattered by sputniks.

Here's the way 1958 looks to us:

Productive Capacity: Overexpansion of capacity, an accumulation of materials in process, and the stockpiling of finished goods are blamed for a large share of the current letdown.

But it's hardly a time to abandon expansion plans: The current needs of many of our people are far from satisfied, and the population continues to grow at the rate of a quarter million a month.

Here's what could happen, for example: Steel capacity in relation to population will turn down again in 1959 unless the industry unwraps plans it has on paper.

Careful planning of future requirements now will pay big dividends later. The challenge is to keep the short term outlook from throwing your long range potential out of focus.

Manpower: The shortage of technical and skilled manpower has been relieved by the slowdown, but the problem will be back. The work force is not growing as fast as the total population. And productivity is not keeping up with the rise in wage costs.

Metalworking companies that meet the challenge will offset rising costs by upgrading their present manpower, improving product design, making better use of materials, and replacing inefficient processes and equipment.

Markets: Shifting markets, the appearance of new competition, and price cutting are problems that become more acute during a business slowdown.

The answer is in creative rather than destructive competition. The challenge is to develop new and better products that have sales appeal. The task calls for imagination, knowhow, and knowledge of markets!

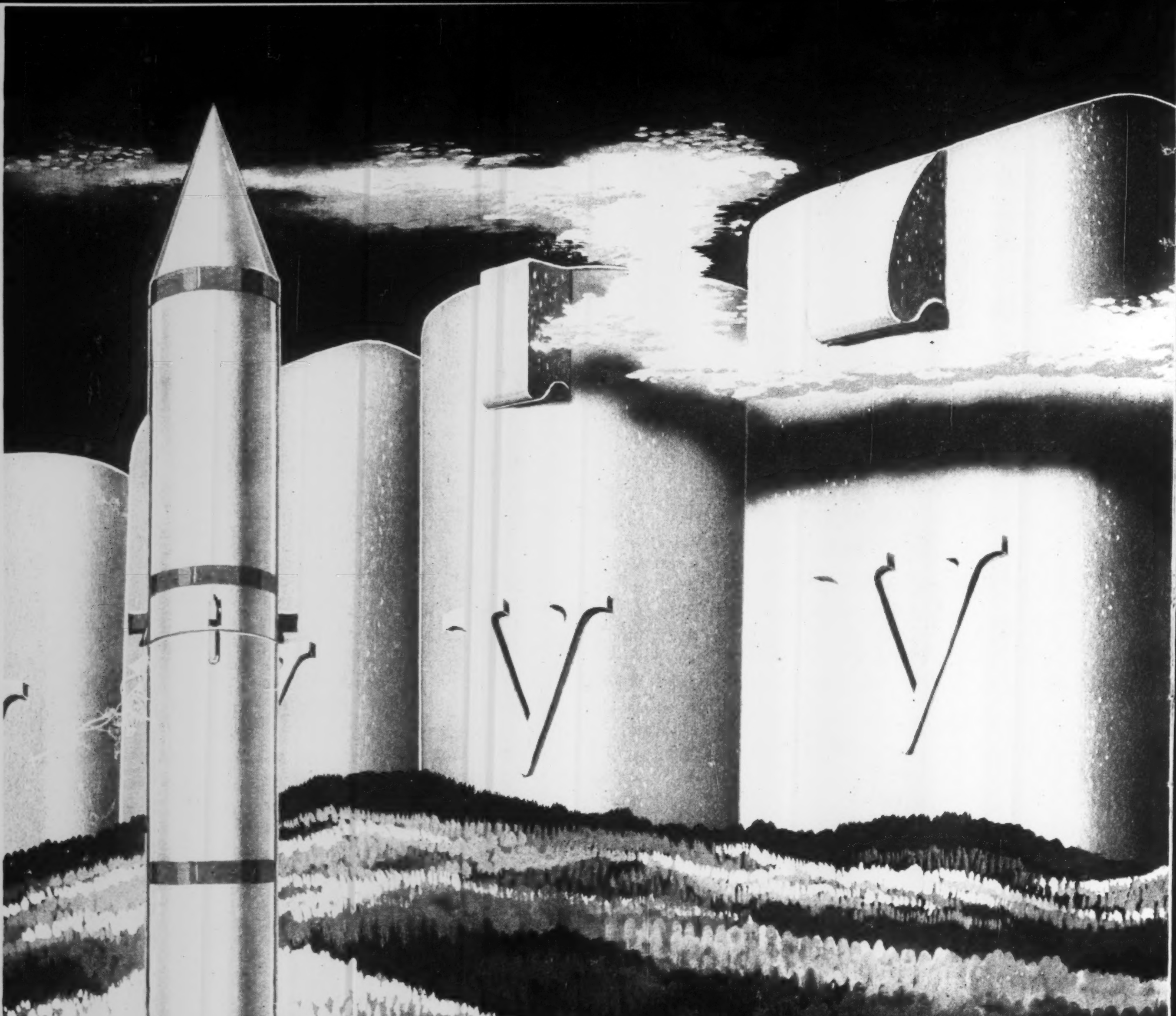
Profits: General Motors' Harlow Curtice once said that unless a manufacturer can sell his products for more than it costs to make them, he will soon cease to be a manufacturer.

His observation points up the No. 1 challenge: Making a profit.

Making a profit will be more difficult in 1958 than it was in 1957, but not impossible. Whether you are the man at the top or on the way up, it's part of your responsibility!

Irwin H. Such

EDITOR-IN-CHIEF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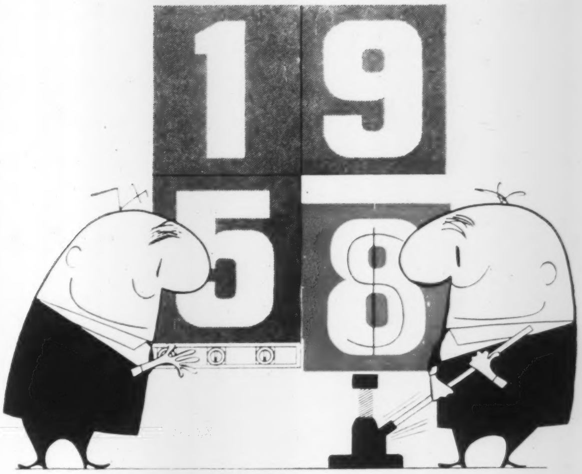


While the Boom Idles . . .

Marketing Shifts into High Gear

THIS will be the year in which the boom takes a rest.

It will be a year in which many metalworking companies will operate at less than capacity. It will be a year in which the customer becomes a most important guy.

Missing will be easy selling, premium prices, and scarcities of men, materials, or machines.

It will be a year to challenge management to maintain or improve profits.

But we're not going to hell in a handbasket. We'll do a lot of business.

True, a sizable minority of metalworking managers participating in this magazine's annual survey of business expectations believe their sales volumes will dip. But the majority expect to equal or exceed their 1957 performances.

Last year was one of paradoxes. While metalworking did a record $140 billion in gross sales, many companies had declines. Spending for new plant and equipment moved into new high ground at $37 billion, but makers of capital goods watched their backlogs melt as the year progressed.

The year coming up promises to be one of sharp contrasts. Wisely managed companies should do well. Marginal companies could be shaken out of the picture.

Get Ready for Growth

Smart managements will accent profits more than volume.

They will also use this year to prepare their companies for the king-size growth ahead.

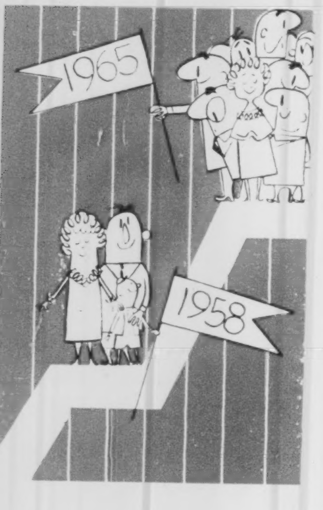
We believe it is important to maintain proper perspective—to view the present dip as temporary, and as a prelude to the next upsurge in the economy. The factors pressing for resumed growth are powerful and cannot long be denied. We will have more people, more family formations, larger per capita spending, higher productivity, and more disposable income. They add up to greater markets.

By the early 1960s, we'll be lookinng back on the 1950s as lean years.

We Have Growing Pains

Right now we have a modest overexpansion in most of our basic industries.

In 1958, the steel industry could produce 143 million tons of ingots. Few steelmakers expect



output to exceed the 1957 figure of 113 million tons.

The automotive industry could produce 10 million passenger cars. The industry expects to make about 6 million.

The machine tool industry could build $1 billion worth of tools. It'll be glad to settle for 60 per cent of that.

But don't forget what we said about perspective. We're talking about a lot of steel, a lot of automobiles, a lot of machine tools. The totals will be high among those of our best years. But as one observer puts it: Our 1958 volume will sort of rattle around in our expanded capacity to produce.

The year now starting will be notable for the absence of strong up or down forces. Fading are the huge capital spending programs by industry. And no consumer program shows particular force. Residential construction will pick up; the highway program will play a supporting role; and defense spending will accelerate. But no factor appears to be as strong as capital spending and construction were in recent years, or as the auto industry was in 1955.

We don't expect any particularly weakening influences—unless a recession psychology develops.

So the outlook is for a breathing spell. Business generally will be on a high-level plateau. It can be made a prosperity plateau.

Look at the Silver Lining

The less frantic pace of production has some inherent advantages. The breathing spell can be used to bring about economies in terms of men, materials, machinery, and money.

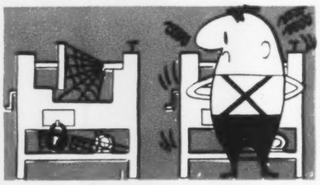
Manpower will be less of a problem. During most of the postwar years, many of us have had to employ what old Navy men call "warm bodies." They were hired only because able personnel were not available. The coming 12 months should see an increase in the availability of competent manpower.

The attitude of workers may improve. A tightening in the employment situation will make better discipline possible. The queen of the coffee break can be dethroned, and the crossword puzzle addict can be persuaded to look for the scientific name of the two-toed sloth on his own time.

Materials will be bought and sold in a buyer's market. The quality of materials and vender service will improve. Any buyer or seller will testify that such trends are already established in steel.

Machinery and equipment will be more readily available. Since Korea, machinery makers' order books have been clogged. Deliveries and service haven't been of the caliber desired by either buyers or sellers. The buyer hasn't been able to get delivery on his first-choice machine, and the seller has lost customers to foreign or competing domestic producers.

Money will become easier in 1958, regardless of what the Federal Reserve Banks or the government may do. The easing in expansion will lessen demand, and the money available will be sufficient to meet all needs.

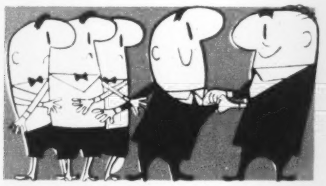


A Do-It-Yourself Program

To dwell too long on the benefits of a boomless year is pointless.

More pertinent is the consideration of measures we can take to maintain or improve our profit power and growth in a year that is good but lacks bounce.

The job will not be easy. Most of us have become accustomed to passing along increased costs in higher prices. Resistance to price hikes will stiffen. Some costs, particularly labor, will continue to mount. Long-term contracts providing automatic increases will have a secondary effect: They will influence collective bargaining where no long-term contract exists. Wise and aggressive management will be required to keep profits up in 1958. It will be a year in which the boys will be separated from the men.



We suggest two areas in which metalworking will want to improve its performance in 1958 and the years beyond.

One is in marketing.

The other is in achieving lower unit production costs through the use of the most efficient machines and equipment available.

Year of the Marketeer

Many metalworking people believe the art of moving goods to the consumer is lagging at least a decade behind our ability to produce goods. The thought presents a challenge and an opportunity. Our tremendous production potential can't help but arouse an awareness that a revolution in marketing procedures is imperative.

We now are on the verge of that revolution.

We believe that 1958 will bring recognition of a new marketing concept. Industry has been nibbling around the edges of the philosophy for several years. Some progressive companies have embraced it. They are enthusiastic about their results. But the majority of companies have held back.

In its simplest form, marketing is finding out what the customer wants and selling it to him at a fair profit. It implies the integration of all the functions concerned with finding out what is wanted, measuring the demand, planning the product, and moving it to the consumer.

Marketing must precede production. As General Electric's Ralph Cordiner puts it: The plan introduces the marketing man at the beginning rather than at the end of the productive cycle and integrates marketing into each phase of business. Marketing, through its studies and research, will establish for the engineer, the designer, and the manufacturing man what the customer wants in a given product; what price he is willing to pay; and when and where it is wanted. Marketing would have authority in product planning, production scheduling, and inventory control, as well as in sales, distribution, and servicing the product.

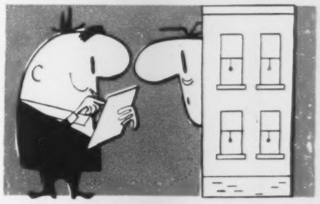
The concept makes profitability the responsibility of marketing. Under the production-sales concept, sales was responsible for volume only. It was up to top management and the controller to call a halt to profitless sales activities.

Finding What the Customer Wants

If you adopt the new marketing concept, you will need men who can determine what your customers want, when and where they want it, and what price they will pay. Keeping attuned to the customer is the keystone factor.

Make no mistake about it. The customer will be the man of the year. When demand exceeded our capacity to produce, he was sometimes ignored, even pushed around a little. Now he is having his turn at bat. Don't be surprised when he insists on all his rights.

Product pretesting, perhaps some motivational research, and certainly better acquaintance with the customer are required. You will want to use the better objective and scientific measuring devices available for such programs.



Charting the Market

Most basic industries have more productive capacity than they need for immediate requirements. Sizing the market is more important than it has been for years. During the years of scarcity, we could turn out all the goods capacity permitted and let the sales department get rid of it. Overproduction can be ruinous now. Nor can we profit by underestimating the market.

Market researchers who can count the customers, analyze demand geographically, and evaluate the product mix required are a must.

Setting the Price

Nothing is more important to profits than establishing the right price. You can price yourself out of the market, or out of the profit picture. Cutting to meet competition can be disastrous.

Pricing becomes a function of marketing, to be evaluated with full cost knowledge, knowing the customer and knowing the market.

Building Marketing Men

Because marketing as an integrated function is new, too few skilled men are available to build marketing organizations. They are a new breed.

Universities are devoting increased attention to teaching the theory, but graduates still have to learn the business, gain the working knowledge needed before they can become effective practitioners.

To industry will fall the job of developing its own marketing men. To aid such programs, you'll want to investigate the assistance available at graduate business schools and the seminars offered by management and professional associations.

How Are Your Costs?

Unit production costs will be the second area of special importance this year. Higher production costs no longer can be easily passed along in price increases. The customer will balk.

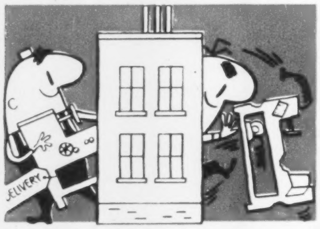
Yet labor costs will continue to climb.

To offset rising costs, you will want to start by re-examining your equipment and machinery in terms of unit production costs. If you have any doubts, ask yourself: "Can I afford not to buy the lowest unit production costs obtainable?"

Can't Afford Not To Buy

A few days ago we were talking to the president of a medium-size, progressive company about the dip in the capital equipment market. Said he: "Capital goods makers should sell a lot of machinery this year. They can't sell it for expansion purposes. But they can sell it to obtain lower unit production costs.

"Look at these," he invited, shoving a sheaf of cost figures across his desk. "These are the cost figures for our present presses, and here are the cost figures for new presses. We can't afford not to buy the new equipment. If we didn't have the working capital, we couldn't afford not to go to the bank and borrow the money to buy.



"These are cost figures our own men dug up. If the capital equipment people are hurting, why didn't they figure this out for us?"

We thought he had a good point for both buyers and makers of capital equipment.

Inch-by-Inch Approach

No metalworking manager can afford to overlook the many other areas that need attention.

Less-than-capacity operations will give an opportunity to review production controls, to reduce scrap losses, to tighten up on the buying of materials and components, and possibly institute a value analysis program.

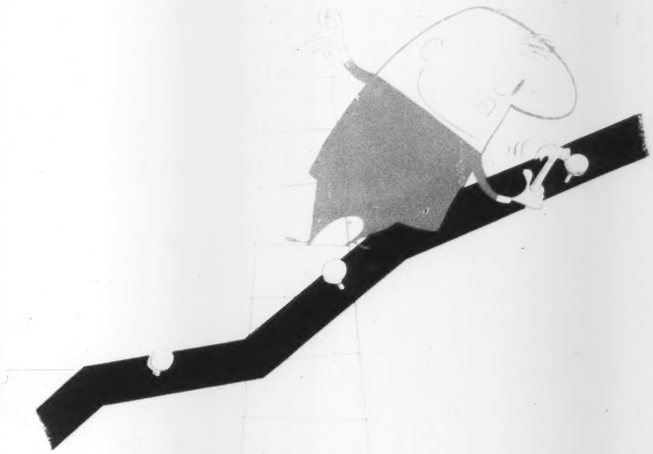
This should be a year to review your balance in management to make sure you are prepared for the resurgence of the boom. It should be a fine year to trim off the fat in your management.

It also should be a year to pay a lot of attention to product development. You will need such insurance to make sure you have the right goods to offer in the larger markets to come.

Year of Potential Rewards

While 1958 may not bring new records in physical production of metalworking goods, it promises rich rewards to wise and aggressive managers. It will require in part a return to the economies of our fathers. It will require a fuller exploitation of the scientific management methods we have learned in the past two decades. And it will require further advances in the newer management arts of re-equipping to obtain lower unit production costs and in integrating our marketing procedures to obtain optimum profits.

Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Management Expects Sales Volume To Hold at High Level in 1958

METALWORKING's dollar sales volume this year will be comparable to the record $140 billion chalked up in 1957.

- Profits will be lower.
- Costs will continue upward.
- Selling prices will rise.
- Employment will be steady.
- Research spending will increase.
- Business will improve in the second half.
- Expansion will slow down.
- Skilled workers will be more plentiful.
- Defense spending will be high.
- More new products will be introduced.
- Marketing will be emphasized.
- Cost reduction will be accented.

That's the thinking of a majority of the country's plant managers who participated in STEEL's annual survey of business expectations. The editors asked the general managers of 7500 plants what they look for in volume, employment, prices, costs, expansion, new product development, defense production, and profits.

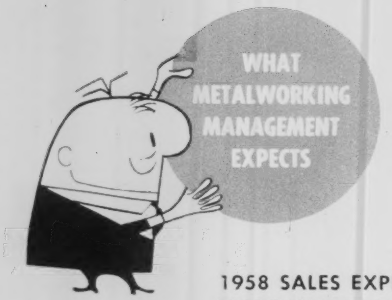
Seven of ten say they expect their '58 dollar volume to equal or exceed last year's pace. In the survey one year ago, 95 per cent of the respondents expected 1957 dollar volume to equal or exceed that of 1956.

Nearly 30 per cent, compared with only 5 per cent a year ago, expect volume to be lower.

Good Foresight—The Editors of STEEL have long believed that the best indicator of the business trend in metalworking is the thinking of company management. Experience has proved this.

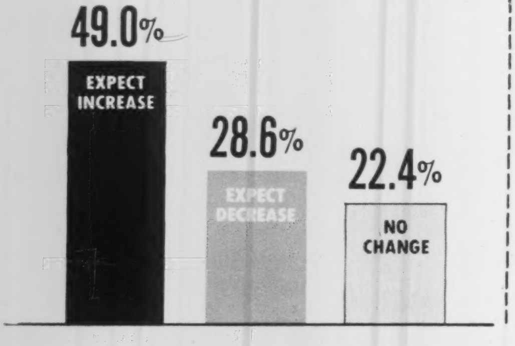
At the end of World War II, the plant managers predicted the postwar expansion. In late 1953, they foresaw the adjustment of 1954, but predicted it would be milder than most economists thought it would be. STEEL's respondents said sales would snap back in 1955. They did. They predicted the record dollar volumes in 1956 and 1957.

Breakdown—By industry groups, here's what the

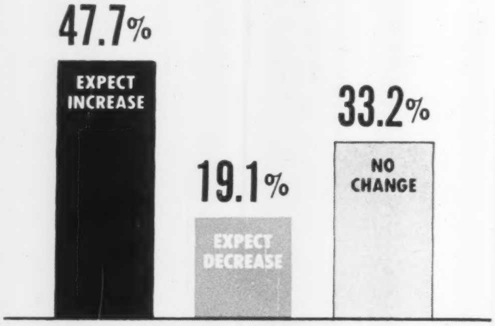


Sales to Rise in 2nd Half

1958 SALES EXPECTED TO
APPROXIMATE 1957 LEVEL



SECOND HALF DOLLAR VOLUME
2.1% ABOVE FIRST



CHANGES EXPECTED IN SALES VOLUME DURING 1958

	Changes Expected in 1958	Second Half Compared to First Half
Analysis by Size of Plants		
Plants Employing 20-99	+4.0%	+2.3%
Plants Employing 100-499	+1.3%	+1.9%
Plants Employing 500 or more	+1.1%	+2.1%
By Major Industry Groups		
S.I.C. 33—Primary Metals	−0.6%	+2.5%
S.I.C. 34—Fabricated Metal Products	+1.9%	+2.6%
S.I.C. 35—Machinery (except electrical)	+2.6%	+0.7%
S.I.C. 36—Electrical Machinery	+6.4%	+4.1%
S.I.C. 37—Transportation	+3.1%	−0.1%
S.I.C. 38—Instruments, Related Products	+4.2%	+3.1%
Other Metalworking Groups*	+6.9%	+5.5%

*S.I.C. 19, 25 and 39.

plant managers look for in 1958: Manufacturers of electrical equipment and instruments expect continuing sales gains. Primary metal producers expect their sales to dip slightly. Other major groups —transportation, fabricated metal products, and machinery (except electrical)—could move slightly up or down from their 1957 sales rates.

Second Half Better—Eight of ten respondents expect dollar volume in the second half to be as good or better than it will be in the first. Almost half the managers expect an upturn. Only 19 per cent look for a second half decline. Transportation is the only major industry looking for a second half setback.

Machine tool builders expect an upturn around midyear as tooling orders for 1960 automobiles start coming in. Easing of credit and the beginning of missile production are other reasons cited for a better second half.

Quite a few respondents believe that by the end of the first quarter, customers will have liquidated inventories to a point where orders for material will begin to catch up with output. Many firms believe their customers will start rebuilding inventories by mid-1958.

Small Firms Report—Plants employing 20 to 99 expect a 4 per cent sales increase this year, compared with a slightly more than 1 per cent rise predicted by larger firms. But they look for tight money to continue to hold back their growth plans.

Employment to Hold Steady

SKILLED WORKER OUTLOOK

8.3% EXPECT SHORTAGE

UNIT WAGE COSTS

82.4% EXPECT INCREASE

3.4% EXPECT DECREASE

14.2% EXPECT NO CHANGE

FACTORS AFFECTING WAGE COSTS:	Per Cent of Plants*
More Overtime	7.1
Less Overtime	11.7
Higher Wage Rates	89.8
Higher Productivity	16.0
Lower Wage Rates	0.4
Lower Productivity	7.0

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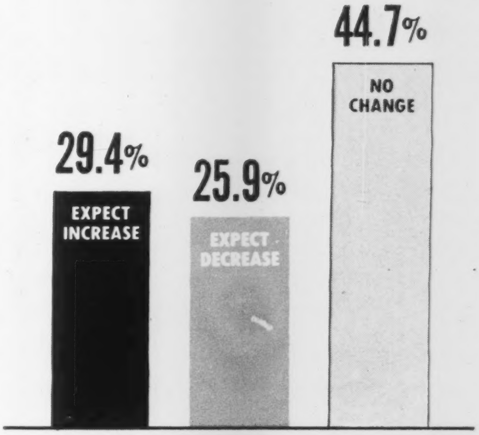
*Figures add to more than 100% because many plants checked more than one factor.



Analysis by Size of Plants	CHANGE EXPECTED
Plants Employing 20-99	+1.0%
Plants Employing 100-499	−0.2%
Plants Employing 500 or more	−1.0%
By Major Industry Groups	
S.I.C. 33—Primary Metals	−1.0%
S.I.C. 34—Fabricated Metal Products	−0.2%
S.I.C. 35—Machinery (except electrical)	0.0%
S.I.C. 36—Electrical Machinery	+2.8%
S.I.C. 37—Transportation	+1.1%
S.I.C. 38—Instruments, Related Products	+2.0%
Other Metalworking Groups*	+2.3%

*S.I.C. 19, 25 and 39.

Capital shortages are expected by 32 per cent of the managers of small firms.

Several respondents echo the belief of a small California component maker who says: "There will be quite a bit of opportunity for small business in defense work this year."

Price Stability—Look for considerably less inflation in metalworking this year. The weighted average increase is predicted at 1.5 per cent. Last year, plant managers expected more than double that; the year before, they predicted a 5 per cent jump.

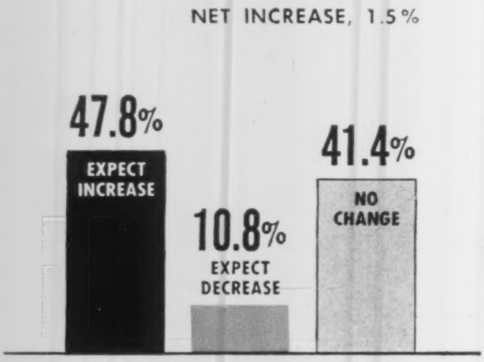
Rugged competition will be the most influential factor in putting the lid on prices. Excess capacity, coupled with weakening demand, will bring wide-

DEFENSE WORK will account for 15.1% of all metalworking production

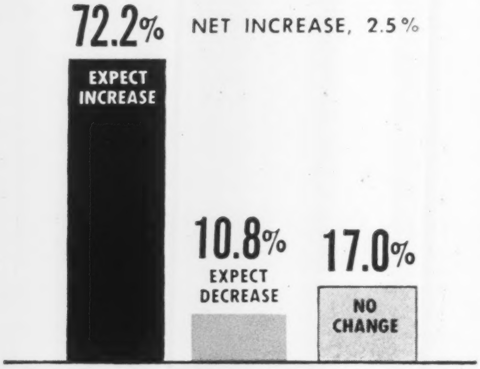
	1958	1957
No defense work	45.6%	48.2%
Less than 25%	36.0%	33.1%
25-50%	9.2%	7.4%
50-75%	2.5%	3.2%
More than 75%	6.7%	8.1%

WHAT METALWORKING MANAGEMENT EXPECTS

SELLING PRICES



UNIT COST OF MANUFACTURING



SELLING PRICES

Analysis by Major Industry Groups	CHANGE EXPECTED
S.I.C. 33—Primary Metals	+1.4%
S.I.C. 34—Fabricated Metal Products	+1.4%
S.I.C. 35—Machinery (except electrical)	+1.1%
S.I.C. 36—Electrical Machinery	+2.1%
S.I.C. 37—Transportation	+2.3%
S.I.C. 38—Instruments, Related Products	+2.2%
Other Metalworking Groups*	+3.2%

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*S.I.C. 19, 25 and 39.

UNIT COST OF MFG.

Analysis by Major Industry Groups	CHANGE EXPECTED
S.I.C. 33—Primary Metals	+2.7%
S.I.C. 34—Fabricated Metal Products	+2.9%
S.I.C. 35—Machinery (except electrical)	+2.3%
S.I.C. 36—Electrical Machinery	+2.2%
S.I.C. 37—Transportation	+2.4%
S.I.C. 38—Instruments, Related Products	+2.3%
Other Metalworking Groups*	+2.6%

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*S.I.C. 19, 25 and 39.

spread cries of price cutting in several industries.

Withdrawal of inefficient facilities from service, plus the installation of cost-cutting equipment, will also keep prices down.

Costs Advance—The unit cost of manufacturing will not climb as much as it has in recent years, but plant managers foresee a 2.5 per cent increase. Rising wage rates will again be the major cause. The higher cost of services, fuel, freight, and power will add to the spiral. Increases in material costs will largely be offset by higher productivity.

Sales and distribution costs are expected to advance 1.9 per cent. Many companies are revising their marketing structures to reduce costs and initiate stronger selling at the same time.

Profit Squeeze Tightens—Caught between galloping costs and nearly stable prices, profits will be severely compressed. Plant managers expect a 1.9 per cent over-all drop from 1957 levels.

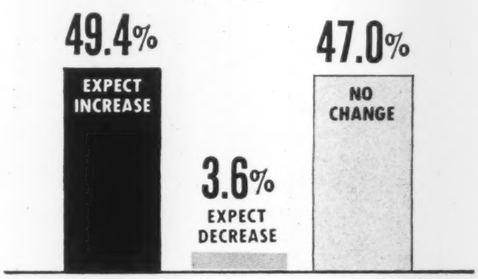
Gray iron foundries are especially hard hit. While their costs have gone up, their sales have fallen. Competition is rugged. Price hikes would be at the expense of sales. On top of that, overexpansion has pushed capacity to about double that now needed. Practically all cost increases of the past year have been absorbed and profit margins have become dangerously small.

The gray iron people aren't alone. Only two major metalworking groups—instruments and electrical machinery—anticipate higher profits in 1958.

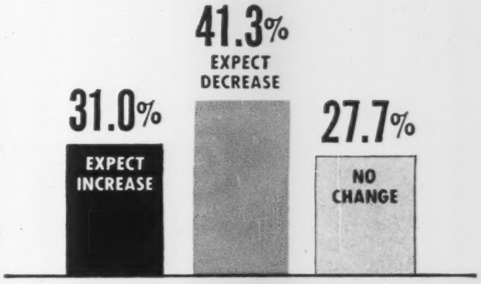
Research Hits New High—More than 35 per cent of the firms surveyed will put more money into

SALES AND DISTRIBUTION COSTS ⇨ PROFIT?

NET INCREASE, 1.9%



NET DECREASE, 1.9%



SALES AND DISTRIBUTION COST

Analysis by Major Industry Groups	CHANGE EXPECTED
S.I.C. 33—Primary Metals	+1.6%
S.I.C. 34—Fabricated Metal Products	+1.8%
S.I.C. 35—Machinery (except electrical)	+1.7%
S.I.C. 36—Electrical Machinery	+2.0%
S.I.C. 37—Transportation	+2.6%
S.I.C. 38—Instruments, Related Products	+3.1%
Other Metalworking Groups*	+2.1%

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*S.I.C. 19, 25 and 39.

PROFIT

Analysis by Major Industry Groups	CHANGE EXPECTED
S.I.C. 33—Primary Metals	−4.6%
S.I.C. 34—Fabricated Metal Products	−3.8%
S.I.C. 35—Machinery (except electrical)	−2.1%
S.I.C. 36—Electrical Machinery	+2.1%
S.I.C. 37—Transportation	−0.8%
S.I.C. 38—Instruments, Related Products	+0.9%
Other Metalworking Groups*	+2.5%

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*S.I.C. 19, 25 and 39.

product research and development. Over-all, they will spend 4.3 per cent more than they did last year.

Three out of five firms will introduce new products during the next 12 months.

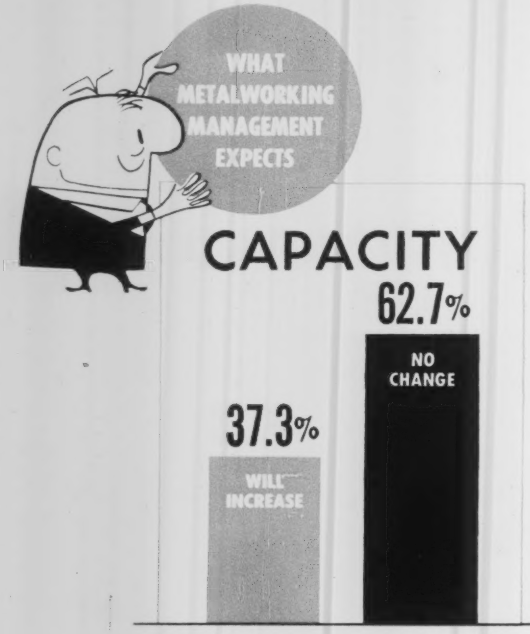
Producers of high strength, high temperature alloys expect their product research to pay off in 1958 because of industry's awareness to, and enthusiastic acceptance of, many new metals.

One industrial equipment producer warns: "Any company not planning new products will face serious trouble in today's competitive, cost-conscious market filled with discriminating buyers."

Says an electrical equipment maker: "We have an aggressive program of new product development, so we look upon any mild recession as a chance to improve our competitive position."

A machine tool builder reports it will cushion the blow by introducing a new plastic molding machine and a new numerical control system built around its drilling, boring, tapping, facing, and milling machines.

Defense Holds Key—"Realization that the nation's defense setup is vulnerable and that the U. S. is no longer unchallenged world leader in research and development will make people feel insecure enough so that they won't press for a tax reduction. A big defense budget would give us the boost we will need to surpass our 1957 sales mark." That comment by the president of a hydraulic firm is typical of the hundreds STEEL received from plant managers who contend that the defense



Equipment Big Factor in Expected 3.5% Increase

OF THOSE EXPECTING TO INCREASE

	WILL BUILD NEW PLANTS	WILL BUILD ADDITIONS	WILL BUY EQUIPMENT	NET INCREASE
	15.0%	42.1%	71.7%	3.5%
Analysis by Size of Plants				
Plants Employing 20-99	12.2%	39.7%	71.1%	3.8%
Plants Employing 100-499	15.6%	45.5%	73.1%	3.2%
Plants Employing 500 or more	28.3%	44.0%	70.1%	2.9%
By Major Industry Groups				
S.I.C. 33—Primary Metals	12.6%	38.8%	78.2%	2.8%
S.I.C. 34—Fabricated Metal Products	4.5%	48.2%	70.7%	2.7%
S.I.C. 35—Machinery (except electrical)	29.4%	33.1%	64.4%	4.1%
S.I.C. 36—Electrical Machinery	20.0%	43.3%	80.0%	6.0%
S.I.C. 37—Transportation	8.0%	41.1%	87.2%	1.4%
S.I.C. 38—Instruments, Related Products	14.3%	51.0%	71.4%	4.1%
Other Metalworking Groups*	14.5%	46.6%	60.9%	3.3%

*S.I.C. 19, 25 and 39.

budget holds the key to 1958 sales gains.

Aircraft cutbacks will be felt more this year than last. Says one maker of components: "We are fully equipped to make complicated parts for any kind of aircraft or missile. But cutbacks, plus constant fluctuation, result in our getting only experimental work. Without production work, we can't keep our employees, accumulate a backlog, or make a profit."

Tight Money—Credit has eased slightly and will loosen more this year. But many metalworking executives believe that money will still be too tight. While some respondents think the "hard money policy" has put the brakes on inflation and was probably for the national good, they also comment that its minuses (the halting or slowing of expansion and modernization plans and the curtailing of durable goods buying) are beginning to outweigh its plusses.

Small companies are especially hard hit; 32 per cent (4 per cent more than a year ago) say that capital shortages will hold up planned expansion this year. Only 13.5 per cent (vs. 17.1 per cent a year ago) of plants employing more than 500 foresee capital shortages.

Materials—In sharp contrast with previous surveys, only two firms report they expect difficulty in obtaining raw materials. In recent years, shortages always prompted many comments.

Skilled Help Adequate—For the first time in several years, experienced tool and die makers, skilled technicians, and professional engineers are unemployed. The trend will continue into 1958. Only 8.3 per cent (vs. 32.4 per cent a year ago) of

METALWORKING MANAGERS TELL

How Plants Will Lower Unit Cost of Manufacturing

HERE'S the most troublesome problem that will confront metalworking management in 1958: How to reduce unit production costs in the face of continually rising wage rates?

It is the problem most frequently mentioned by the respondents to STEEL's survey. They agree that such costs can be cut most effectively by a re-examination of productive equipment and its modification or replacement.

Here's what some intend to do:

- "We find that new presses will enable one operator to produce twice as many pieces as he can make on our present equipment. We have figured all the costs—including depreciation, interest, direct and indirect labor, power, and overhead—and have decided that we can't afford NOT to buy the new equipment, although we'll have to borrow the money to do it. It will pay for itself in less than 3½ years on our projected volume."—Midwest stamper.

- "We plan to offset higher wage costs by installing more efficient machinery and automating our production lines where possible."—Chicago electronics firm.

- "Profit survival in the face of higher wage demands, heavy taxes, and more severe competition will be met through cutting unit production costs at every possible point. Despite an uncertain outlook, we are surveying our entire production line; if we find that new equipment will do the job cheaper, we'll buy it, although we anticipate difficulty in raising the money."—Southern component maker.

- "As producers of labor-saving machinery, we look for a 10 per cent sales increase. Our customers realize they must reduce their costs to make a profit." —Eastern conveyor manufacturer.

- "We're adding new machinery and cutting down on employment. The only way we can see to maintain profit margins is to lower employment costs. For this, you need more efficient machinery."—Cleveland automotive part maker.

- "We will standardize our frame parts and manufacture them on a volume basis to cut costs. It will require new machinery, but it will soon pay for itself."—Midwest furniture manufacturer.

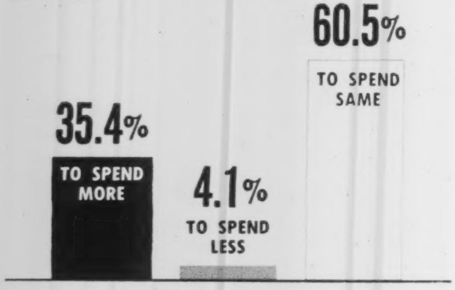
WHAT
METALWORKING
MANAGEMENT
EXPECTS

NEW PRODUCTS

60.6% Expect to
Introduce New Products

PRODUCT RESEARCH

They Expect to Spend
4.3% More Dollars
In 1958



CAPITAL SHORTAGES

26.4% Report Capital Shortages
Will Curtail Expansion

Analysis by Size of Plants	Expect Capital Shortages
Plants Employing 20-99	32.0%
Plants Employing 100-499	21.4%
Plants Employing 500 or More	13.5%
By Major Industry Groups	
S.I.C. 33—Primary Metals	21.8%
S.I.C. 34—Fabricated Metal Products	22.1%
S.I.C. 35—Machinery (except electrical)	34.7%
S.I.C. 36—Electrical Machinery	30.1%
S.I.C. 37—Transportation	17.7%
S.I.C. 38—Instruments, Related Products	20.3%
Other Metalworking Groups*	24.2%

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*S.I.C. 19, 25 and 39.

respondents expect output to be curtailed by a shortage of skilled workers. The problem has become one of quality rather than quantity. Competitive bidding for engineers is still a source of worry to plant managers. A few see the need for better supervisory help.

Foreign Competition Grows—American markets continue to be flooded by flashlights from Hong Kong, cameras and novelties from Japan, watches from Switzerland, surgical and dental instruments from Germany, Switzerland, and other countries, a deluge of flatware from Japan, and jewelry from other foreign countries.

In 1953, imported flatware from Japan equaled only 4.8 per cent of U. S. manufacturers' sales. By the first quarter of 1957, the figure climbed to 54.3 per cent. Japanese workers receive 22 cents per hour, vs. $2.39 for U. S. workers. Say U. S. manufacturers: Under the world trade policy, we expect to sacrifice a portion of our market. But when the figure reaches 50 per cent, the economic welfare of our business is being undermined, and the livelihood of our employees is being destroyed.

Competition from foreign steel producers in domestic and export markets is growing. One U. S. firm reports it was underbid 30 per cent by a West German producer on a Cuban order. Foreign steel is being offered in the heart of America at prices below those of domestic mills.

Machine tool builders and tool and die makers also are feeling some pressure from imports.

On the Farm—Makers of agricultural machinery and miscellaneous farm equipment expect a moderate sales increase. Says one plant manager: "Farmers have held back their buying in recent years. With incomes rising, many will re-enter the market in 1958. Tractors bought immediately after World War II are wearing out and will have to be replaced."

Road to Sales—Road building will accelerate in the coming 12 months. The trend will continue upward through 1960. A large number of companies mention this activity as their No. 1 source for increased sales.

Growth in school, church, and public building construction is also noted as a strong influence in the sales plans of many companies. Expansion plans of utilities also help. A furnace manufacturer expects a sales gain of 10 per cent as a result of the 1.1 million housing starts predicted for 1958. A firm producing signs and displays looks for a sales increase of over 5 per cent because of subdivision and shopping center construction on the West Coast. A producer of cast iron pipe and cast steel tubing expects increases in housing and road building to offset losses in industrial expansion and aircraft. Several firms expect less buying by railroads to lower their sales volume 5 to 10 per cent.

• Extra copies of this survey are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

Here's what U. S. Steel Supply's **ANY STEEL ANYWHERE ANY TIME SERVICE** means to Dray Manufacturing Co.

"Dependable Service from U. S. Steel Supply has

INCREASED PRODUCTION 50%"

says
James H. Dray,
President,
Dray Manufacturing Company, Inc.

"The net result of a 4-year association with U. S. Steel Supply has meant a *proven* 50% increase in our total production," says Mr. James H. Dray, President of the Dray Manufacturing Company, Inc., Downey, California, manufacturer of metal office furniture.

By using U. S. Steel Supply's ANY STEEL, ANYWHERE, ANY TIME SERVICE, Mr. Dray eliminated the need for a voluminous inventory. "We previously carried a $60,000 in-plant stock of cold-rolled steel sheets," he says. "Today, we have less than $16,000 worth on hand, because we have our steel delivered, if necessary, on a day-to-day basis from U. S. Steel Supply—and the increase in available working capital, which had been tied-up in inventory, permitted us to buy additional production equipment *we could not afford before.*

"Secondly," says Mr. Dray, "our reduced inventory also made an extra 10,000 square feet of space available for increased production facilities and machinery." Steel buyers, like James H. Dray, have found that by using ANY STEEL, ANYWHERE, ANY TIME SERVICE it is actually *less expensive* to buy from U. S. Steel Supply.

Why not put this service to work for you?

Your steel needs, regardless of your location, can be handled immediately and accurately by U. S. Steel Supply's ANY STEEL, ANYWHERE, ANY TIME SERVICE. You'll get money-saving, time-saving and problem-solving benefits when you deal with U. S. Steel Supply, *plus* the invaluable experience of our metallurgists, our engineers and our sales representatives.

If you want one of our representatives to help you plan for new efficiency, new economy and new profitability in your future steel buying needs, just write to U. S. Steel Supply at the address listed below.

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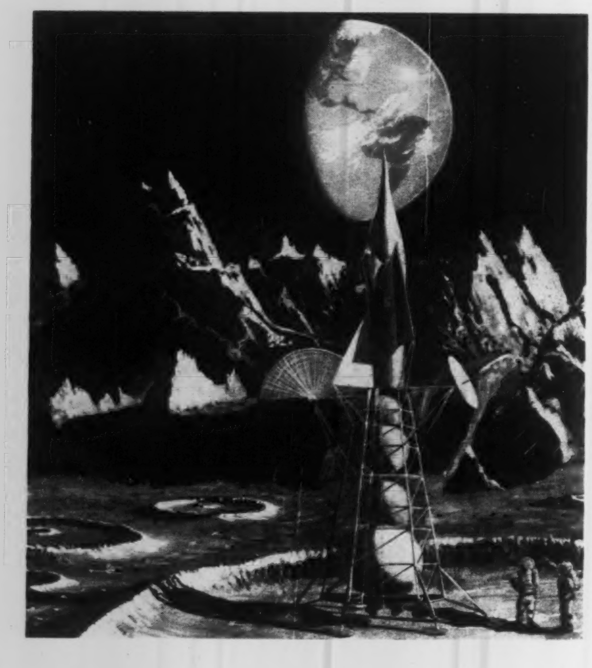
UNITED STATES STEEL

Can We Beat Russia to the Moon?



We have more than a program for manned satellites and interplanetary travel. We have several programs: Each service has its own ideas and several branches within the various services are conducting research. The question: Is that the quickest way to achieve results? Rocket experts around the country will bombard Congress in 1958 with their own special projects.

Out of this mess can come a single effort to get this country into space in five years. (It's possible, say the experts, given the money and personnel.)

It would cost about $200 million to get a single new program started, one Washington observer tells STEEL, which would obviously cost billions before it was finished. This leads to the question: Do we have any choice in the matter?

A Sense of Urgency in '58

This will be the year of challenge for Republicans. The party must lead the nation in establishing new policies to counter the Russian threat. Defense will grab the headlines

DEFENSE will continue to be the major interest in Washington this year.

New Russian satellites (perhaps half a dozen during the year) will spur demands for action by the U. S. Our preliminary efforts (a 6-in. ball scheduled to be launched this month and a fully instrumented satellite slated for take-off in March) will be feeble by comparison with Russian feats.

Elections this fall will be settled on local issues, but sputniks will dictate the main trends. The Democrats will probably win in November because the party in power is bound to lose if things go wrong.

Congressional Temperament — Congress will react to sputniks in one of two ways: 1. Accept Ike's balanced budget of about $73 billion, including an additional $1.5 billion for defense. 2. Reject the President's program and demand $3 billion more for defense, plus government financial aid for programs Ike would eliminate to save the treasury at least $1 billion.

Higher taxes for individuals (and possibly corporations) are certain if Congress takes the second course. The first course represents the philosophy of the President and Sen. Lyndon Johnson (D., Tex.). They think it's possible to have a balanced budget, a sound economy, and maximum defense—a view that could bring about the biggest political hassle of our times in 1960.

You can count on the Russians to continue their efforts after 1958, and if they are first with manned satellites or moon landings, all hell will break loose on the U. S. political scene.

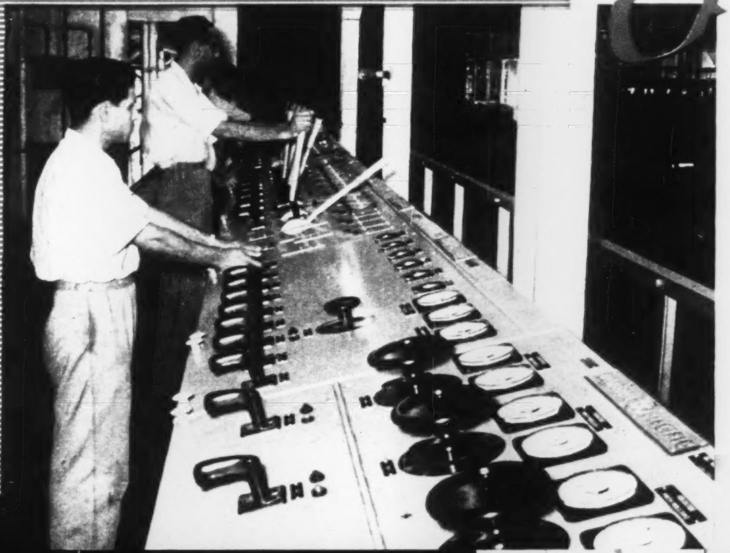
We will see Ike's influence sink to new lows in 1958. Congressional dominance of U. S. policies this year will be the ruin of the Republican administration.

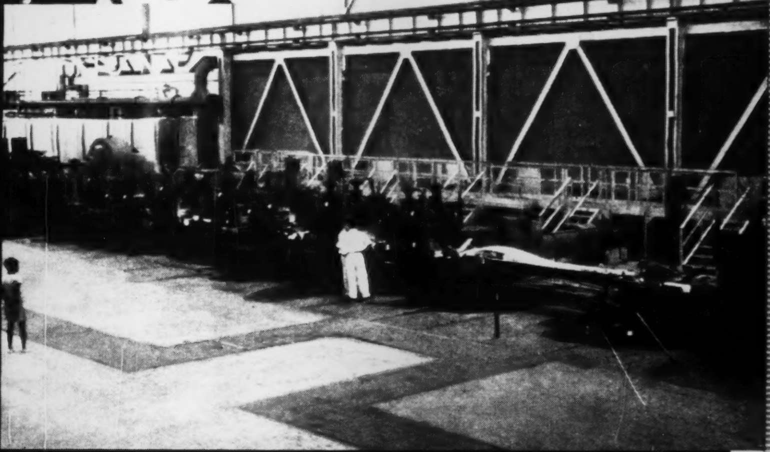
Foreign Trade — The White House will even have troubles with conventional matters. The administration's desire for a five-year extension of the Reciprocal Trade Agreements Act is doomed to failure. Rep. Sam Rayburn (D., Tex.), House speaker, and an advocate of lower tariffs, admits a "whale of a fight" will take place before the act is extended at all. Neither lower tariffs nor the Presidential power to cut tariffs will be extended. But extension of the

MORGAN MILLS
at work in India

14″ SKELP MILL

Tata Iron and Steel Co., Ltd.
JAMSHEDPUR, INDIA





Since 1917 Morgan Construction Company has been contributing skilled engineering talent and precision built continuous rolling mills to the national growth of India. The mill illustrated here is a 14″ skelp mill recently installed for the Tata Iron and Steel Company at Jamshedpur.

This modern skelp mill is just one example of two-hundred and twenty-one Morgan Rolling Mills that have been designed, built and installed in plants all over the world.

MORGAN
WORCESTER

MORGAN CONSTRUCTION CO., Worcester, Massachusetts
Rolling Mills • Morgoil Bearings • Wire Mills • Regenerative Furnace Control • Ejectors • Gas Producers
RM 73

act for three years seems probable. You will see a solid test of Vice President Nixon's persuasive powers with Congress: The White House has made foreign trade his baby.

Atomic Energy—Can we give our allies atomic secrets to prepare them for the Soviet menace? Look for another hassle here, but expect an agreement to allow the President to give what he thinks necessary.

We have just announced the world's first full-scale atomic power plant for civilian use at Shippingport, Pa. This year the Democrats take that development as a challenge to push through a big civilian program for atomic energy to be paid for by the government.

With Russian atomic plane developments perhaps ahead of ours, look for anything designed to gain rapid U. S. atomic advances to be passed by Congress this year. Dollars will be no object.

Rep. Carl Durham's (D., N. C.) proposal for a ten-year demonstration power reactor program will be the kickoff for Congressional action. He is chairman of the Joint Atomic Energy Committee.

Science's Advance — Basic research should get a healthy boost with tax benefits for firms to do needed research and help from government scholarships to teachers and students. A move to create a special cabinet seat for science will get nowhere. The Pentagon will remain dominant in U. S. science when the year ends. A special Manhattan-type project for space developments remains high on the list of things Defense Secretary Neil McElroy hopes to accomplish, but it will be a Defense Department program for the most part.

Agency Inquiry—Various agencies of the executive branch will be sniped at by Rep. Morgan Moulder's (D., Mo.) Special Subcommittee on Legislative Oversight. The group is after agencies like the Federal Power Commission, National Labor Relations Board, and Civil Aeronautics Board. Representative Moulder thinks they are moving into the judicial field as regulatory agencies for the President.

The question appears tough to answer: Who will make the judicial-like decisions if the agencies

The Legislative Outlook for 1958

Atomic energy—The Democrats feel they may be able to push through a larger government-owned atomic plant program.

Basic research—Both parties will sponsor bills to promote more of it through tax benefits for private industry and increased government participation.

BDSA—The Business & Defense Services Administration's budget for fiscal 1958-59 will probably go through as requested by the administration, although no hikes from the budget for fiscal 1957-58 will be asked.

Debt ceiling—Look for a temporary increase of $2 billion to $3 billion in the last quarter of 1958.

Defense budget—While such leading Democrats as Sen. Stuart Symington (Mo.) will request more billions on top of President Eisenhower's increase of $1 billion to $2 billion over the budget for fiscal 1957-58, more conservative Democrats like Rep. Clarence Cannon (Mo.) are expected to try to hold the budget line. It's a tossup, unless further Russian successes alarm the public more.

Depressed areas—Some minor legislation could pass in a "sideways" economic year.

Fast tax writeoffs—Scheduled to die at the end of 1958 (the program has one foot in the grave now and the other on the edge), there is a chance writeoffs will be continued to help space-minded firms do badly needed research.

Foreign aid—The President's request for $4 billion for fiscal 1958-59 could be cut by $1 billion, think many legislators, without great harm to Free World strength. If Congress boosts the defense budget, foreign aid is bound to be cut.

Foreign trade—Extension of the trade agreement act will be for three years rather than the five years requested. Greater tariff cutting powers for the President are out.

Highways—Bickering hurts the program, but an additional 7000 miles will probably be added to it.

Machine tools—Sen. John Sparkman's (D., Ala.) bill to set up a maintenance fund for government-owned tools could get the go ahead signal.

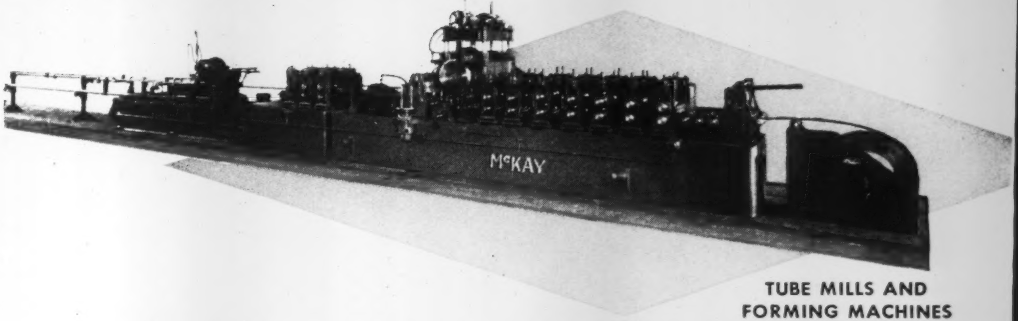
Minerals policy—We are as far away from an over-all policy as we ever were, but agitation for a new look will continue to build up steam.

Minimum wage—The union's pet program of $1.25 an hour doesn't stand a chance.

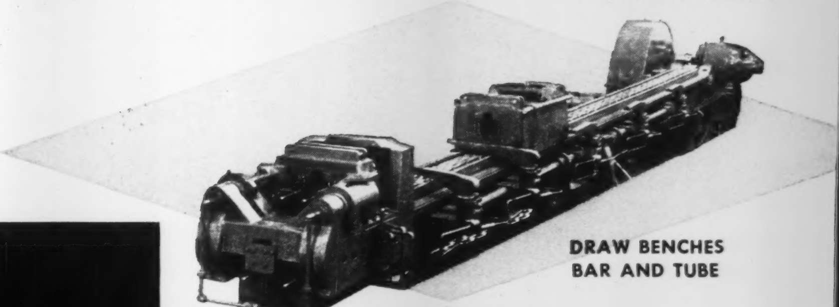
Missile agency—A separate department, free from Pentagon influence, is unlikely. A setup within the Defense Department could come that would add budgetary powers to the missile boss's advisory powers.

Natural gas—This election year is particularly bad for a bill which would free the gas companies from federal regulation.

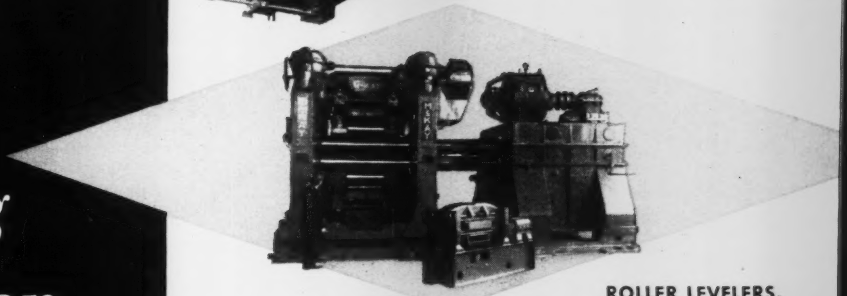
(Please turn to Page 135)



TUBE MILLS AND FORMING MACHINES

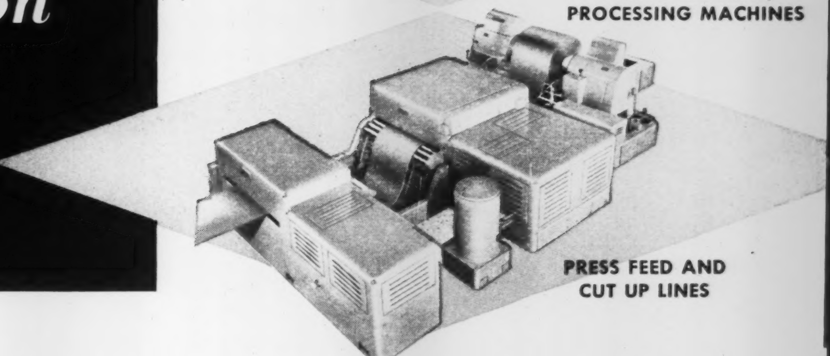


DRAW BENCHES BAR AND TUBE



ROLLER LEVELERS, PROCESSING MACHINES

Metal working Automation in action...



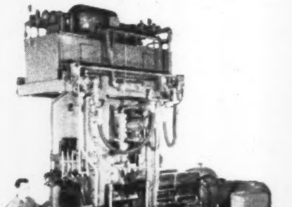
PRESS FEED AND CUT UP LINES

If you're in the metal working business, you should be acquainted with McKay *automated* lines available for many metal working operations.

McKay pioneered and has played a leading role in the development of such equipment as that pictured on this page.

Basic McKay designs can be modified, or special machines developed to meet specific requirements.

THE McKAY MACHINE CO., YOUNGSTOWN, OHIO



SPECIAL MACHINERY

McK

this 140-TON horizontal milling machine

There's never been one like it before!

Just a press of a button puts this mighty Schiess into action. A 25-ft. high column moves smoothly along 45-ft. long bedways. Never a vibration—no chatter—even at maximum transversal loads! The new Schiess design of the spindle heads has eliminated this!

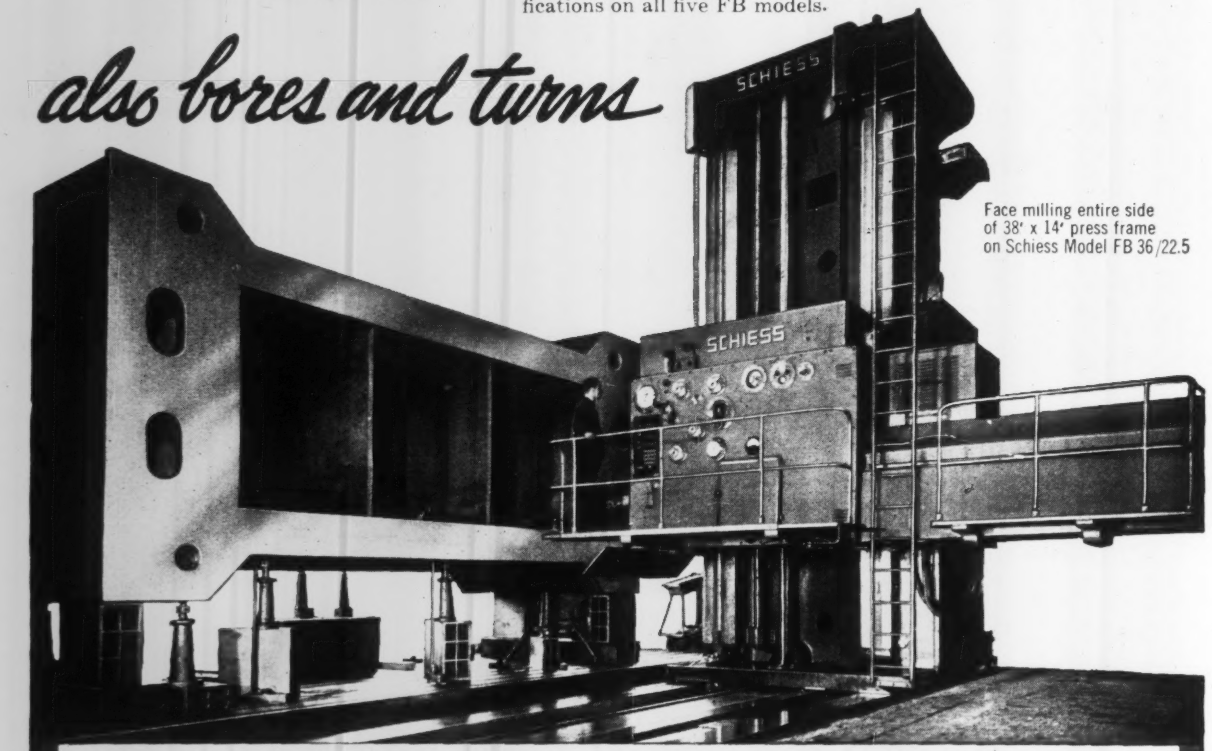
THE MILLING OPERATION. A huge tungsten-carbide cutter in a 14¼″ spindle goes to work on the stock. And performs its operation with a consistent accuracy—a surface-finish count—never before obtainable on such a big fellow.

THE BORING OPERATION. Another press of a button! Another spindle goes to work—bores a 79″ depth in one cut—or a total depth of 118″. Boring and milling spindles are provided with 36 speeds of which the top 12 are V-belt transmitted. Rapid traverse, feeds and manual controls of the two spindles are completely independent.

That this mighty machine has tremendous productive capacity is self-evident. And its productivity goes far beyond conventional milling and boring. Schiess attachments increase its scope to taper-milling, thread-cutting, copying and, in certain instances, copying in 3 dimensions. It's a time saver, too. Can go from feed to rapid traverse immediately, without complicated adjustments.

The Schiess Model FB 36/22.5 Horizontal Milling and Boring Machine is a product of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess Engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on all five FB models.

also bores and turns



Face milling entire side
of 38′ x 14′ press frame
on Schiess Model FB 36/22.5

SCHIESS

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AMERICAN SCHIESS CORPORATION
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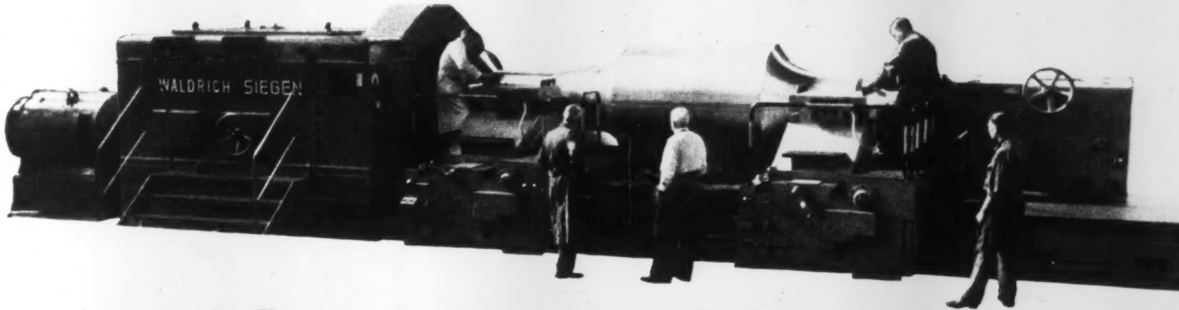
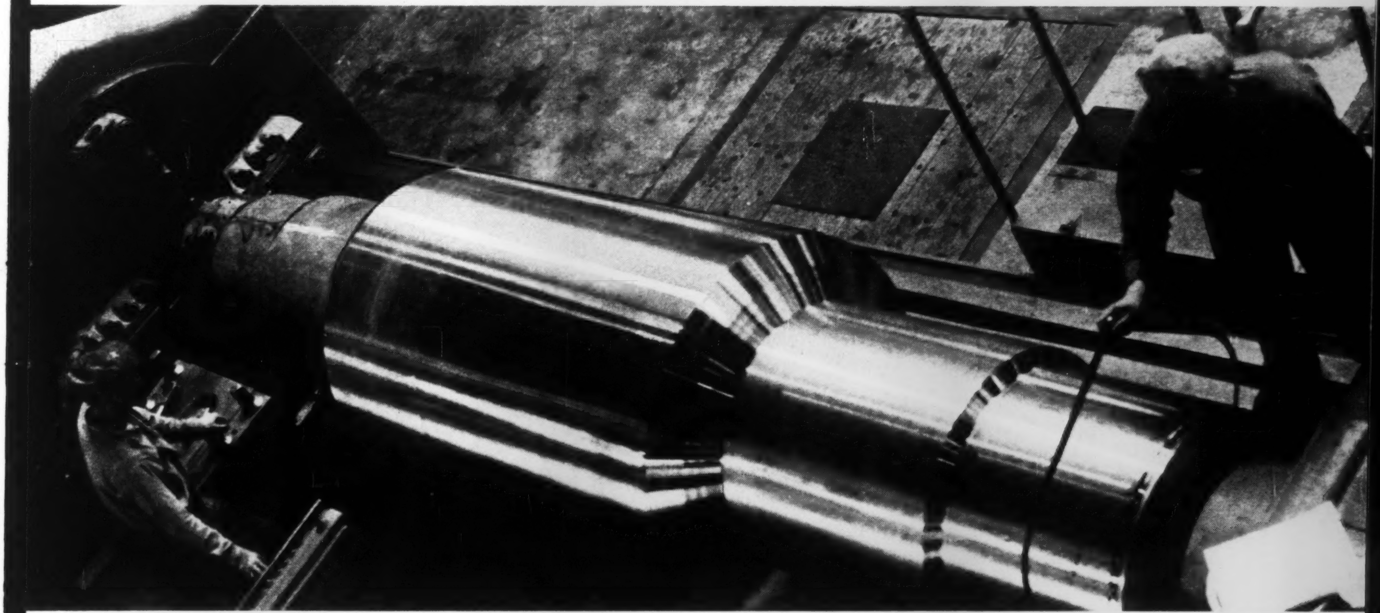
this Waldrich giant



swings a 90-ton roll



—cuts rough turning time 75%

You're looking at the business end of a Waldrich-Siegen Roll Turning Lathe, built to turn a workpiece as long as 30 ft., as fat as 63 in. in diameter, and as heavy as 90 tons!

Right now, you're seeing it in action at the Ohio Steel Foundry Co., Lima, Ohio, biting into a 57-ton, 98-in. long roll, with a 53-in. O.D. In just three passes, its hungry cutters will shear 15 inches of steel off this diameter. Before it's through, 12 tons of turnings will come off.

This job used to take 68 hours at Ohio Steel Foundry. The husky Waldrich breezes through it in just 16½ hours flat.

It takes plenty of muscle to peel through so much steel and the Waldrich has it, delivering 250 horsepower to the spindle. Speed is set at the selector wheel, feed at each of the two independent carriages.

And here's an interesting economy note: chips from the Waldrich lathe are large enough to be remelted, unlike finer chips from other lathes that oxidize too quickly. Ohio Steel Foundry collects a bonus of $15 on every ton salvaged.

Three different size Waldrich lathes are now in operation at this plant, turning workpieces with maximum O.D.'s of 36″, 48″ and 63″. Maybe one of these sizes is the answer to your roll turning needs. It's easy to find out. Write today for complete details on these heavy producers.

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No matter what your washer requirements may be . . . every type, size, material and finish . . . look to Wrot Washer as your No. 1 source. Write for Catalog No. 40.

DEALERS: Order from your regular jobber . . . 1-lb. and 5-lb. packages, put up in 200 lb. shipping cartons.

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WROT WASHERS
SINCE 1907
5 LBS. STEEL WASHERS
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plus...
modern
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In keeping with a policy of "dressing up" the washers themselves, by our special washing process, they are now put up in attractive 1-lb. and 5-lb. packages with a tough, transparent Mylar window which makes visible the actual washers . . . *clean to handle, better to use.*

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THE WORLD'S LARGEST PRODUCER OF WASHERS

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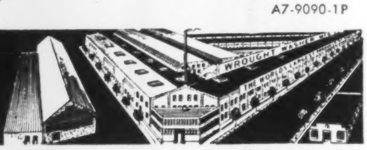

WROUGHT
THE WORLD'S LARGEST PRODUCER OF WASHERS

themselves lose the power? Another agency?

Money Matters — Republican fiscal policies will keep a little of the limelight, as Sen. Harry Byrd (D., Va.) reviews Federal Reserve Board activities once more. The outlook is for another cut in the discount rate.

Labor—The administration's labor program will run into opposition from both sides of the aisle. It is too tough or too easy, depending upon your viewpoint. Jail sentences for racketeers and some legislation requiring disclosure of welfare funds appear possible—but not certain. Unions want nonunion welfare funds to be subject to the same legislation. Don't look for the Taft-Hartley Act to be overhauled this year.

Small Business—Some loan help for small firms may be in the wind. Sen. John Sparkman (D., Ala.) is pushing a bill to insure small loans made by banks and one that would establish national investment companies chartered by the FRB to invest money in small companies. The House Small Business Committee also promises a bill for loans, plus some tax relief.

Taxes—Don't expect any tax relief, whether you are small or large. Some help could come in estate taxes for small outfits, but the corporate rate of 52 per cent is bound to be extended, as will the excise taxes. Many Congressmen still have hopes of revamping personal income taxes to "equalize" the load, but charges of "favoritism" will squash any large-scale changes.

The chance for increased taxes in 1958 is not to be ruled out entirely—although it appears unlikely at this time. A reduction of $100 in personal income tax exemptions is an easy way to raise another $2 billion or so in revenue, and the likelihood of a drop in revenues from corporations (because of declining profits) is recognized by the Treasury Department. Increased corporation taxes this year would follow increased personal taxes, rather than precede them.

Controls—Sen. Homer Capehart (R., Ind.) followed Sputnik I with a call for standby controls on wages and prices, but the outlook for something of an economic plateau this year bars Congressional enthusiasm for the measure.

Competition between government and private industry requires no new legislation. Some progress can be expected as Defense considers closing 912 business activities in addition to the 570 already closed or curtailed.

The Hells Canyon issue will probably be reopened as private power interests attempt to keep more federal dams from coming into the Pacific Northwest.

Midwesterners should be prepared for a squabble between interests that wish to transfer control of the St. Lawrence Seaway from the Army Corps of Engineers to the Commerce Department and those that want the Engineers to keep it at least until it is complet-

(Continued from Page 130)

Prenotification of mergers—Sixty days' notice of a merger will be required.

Price and wage standby controls—Sen. Homer Capehart's (R., Ind.) ideas won't get by either house.

Procurement—Legislation to pinpoint small business' share of government procurement is an impossibility.

Railroads—Government backing for new equipment is possible, although the desire to hold down the budget will probably win out.

Right to work—A national law is out of the question.

Rivers and harbors—Agitation to cut government costs will have little effect in this area.

School construction—The idea to build schools will be translated into a program to improve present teaching standards and emphasize scientific courses. Government scholarships are likely.

Small business—No major tax aid is in the cards.

SBA—Small Business Administration will get permanent agency status.

Statehood—This could be the year we add No. 49 and No. 50: Alaska and Hawaii.

Stockpiling—Congress will protect industry against any dumping recommendation that comes from the Office of Defense Mobilization. Programs for buying the glamour metals (such as boron) appear likely.

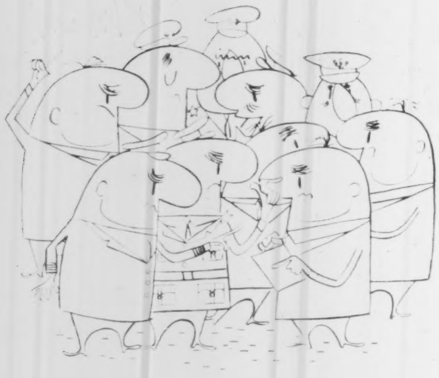
Taft-Hartley Act—No change.

Tariffs—Tariff Commission and ODM will handle metal problems without new legislation.

Taxes—Extension of corporate and excise taxes. No individual income tax cuts. But no increases.

Union elections—The Labor Department's hope to supervise elections of union officials won't be satisfied.

Welfare funds—We won't require full disclosure of union funds unless nonunion funds are put in the same category, and the insurance companies (and others) are fighting that hard.



How Much Do We Need for Defense?

Late in January, 13 men will begin to hear Defense Department witnesses on our defense budget for the fiscal year beginning July 1, 1958. Rep. George H. Mahon (D., Tex.), heads the House of Representatives' Defense Appropriations Subcommittee which could, conceivably, make the most fateful decisions of the 20th Century.

The subcommittee will want to know:

1. Is the administration's continued reluctance to unbalance the budget likely to put us farther behind the Russians in missile and space weapons development?

2. Can the Defense Department do a sincere job of developing new space weapons, or is it too concerned with requirements of the individual services?

3. If a separate civilian agency for space weapons were established, could it count on full co-operation from the Pentagon?

4. Is industry free to offer the nation its best ideas for new weapons, or are startling, new developments choked off by Pentagon red tape?

5. Can we continue to count on massive retaliation as our principal deterrent to war, or should we go all-out for small atomic weapons with which we could fight a series of limited wars?

ed. The toll question is behind that fight.

Highways — With the federal program about to pay off at last, a new effort will be made to establish the proper long range relationship of the federal and state programs and the primary and secondary highway systems.

The move to add 7000 miles to the 41,000-mile system will meet some opposition but will go through.

Some 500 miles of the federal program will be completed this year, with the dirt "really scheduled to fly by 1959," says Bureau of Public Roads.

War Plans—Behind much of the activity in Congress this year will be the need to revitalize our defense thinking. So many essentially domestic measures have so long been tied with so-called defense planning that many Congressmen no longer know what our war plans really are, or what war plans themselves are supposed to encompass.

Congress, with a lead from the administration and a push from the Pentagon, will hear more about such things as nuclear war, limited war, limited nuclear war, and nonlimited, nonnuclear war. Certainly, the Vanguard project stands out as the leading example of what can happen when no one knows exactly where defense planning begins and ends.

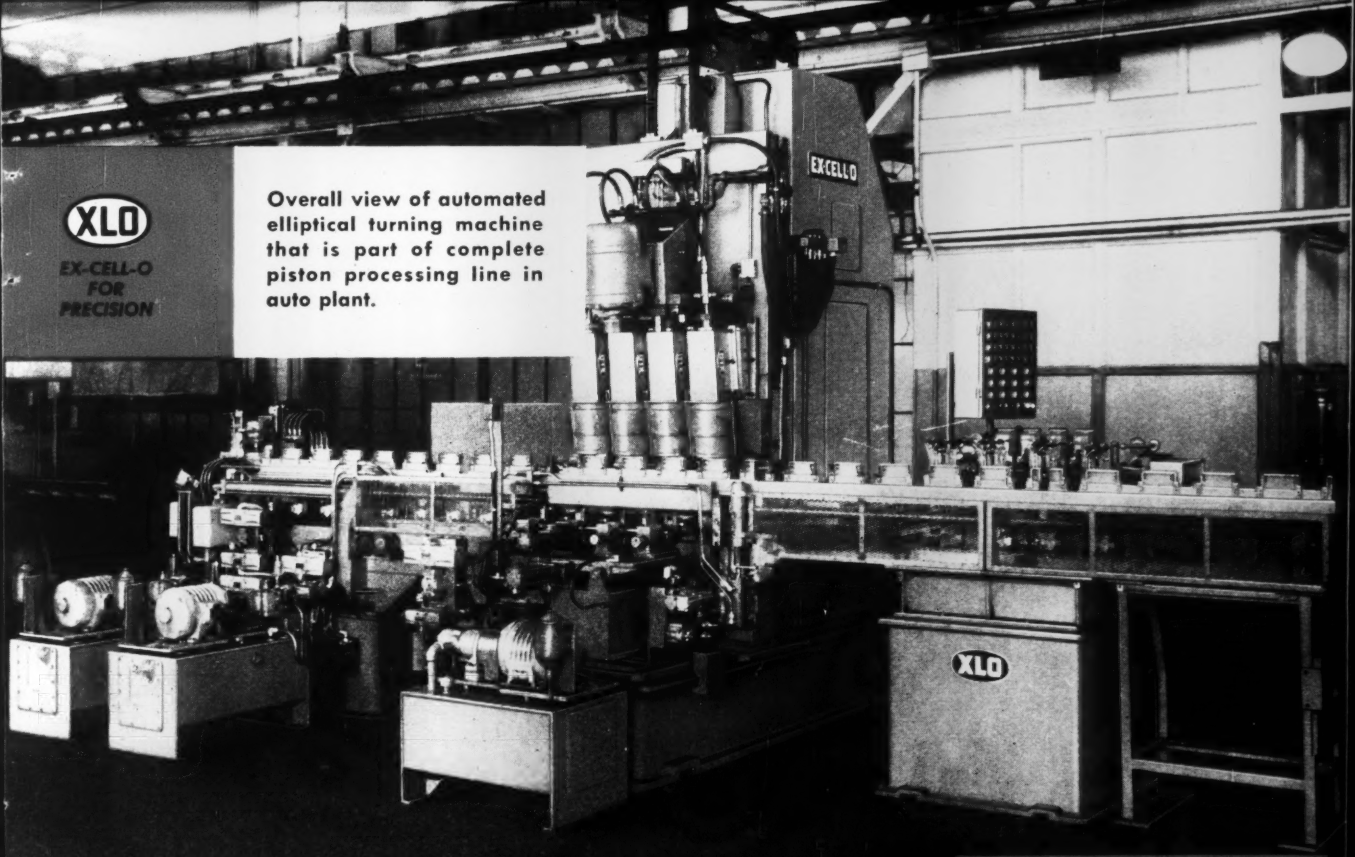
So look for great attention to be paid to the Defense budget debate, not only because of the dollars involved but also because of the purpose revealed by the administration's recommendations. Current thinking looks like this: 1. We can't stockpile the weapons we have or will have in the near future because they aren't good enough for the job. 2. We must authorize additional money for future weapons, and somehow we must straighten our lines of communication so that the "upstream" space weapons get from the inventive engineer's brain to the production line.

Out of this debate could come the civil agency demanded by some Congressmen after Sputnik I. But it would not be a missile agency with a missile czar. It would be what you might term an industrial approach to war.

What would it mean to industry, particularly metalworking? 1. No mass production of missiles, but the establishment of production lines prepared to build missiles (the latest variety) at a moment's notice. 2. No billions for military hardware, but billions for research and development.

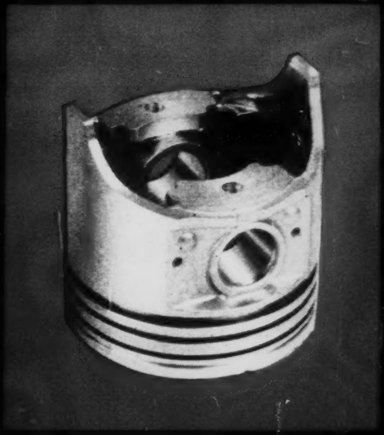
Obviously, we would have to maintain enough missiles and/or long range bombers to carry out massive retaliation, but the emphasis would be on standby production facilities to fight the limited wars now envisioned by top Pentagon and State Department sources.

How far Congress goes along with this thinking will determine metalworking's economic outlook for defense business for some years to come.



Overall view of automated elliptical turning machine that is part of complete piston processing line in auto plant.

Roughs and Finishes 250 Pistons per Hour



57-77

This automated Ex-Cell-O machine semifinish and finish turns an elliptical shape on automotive piston skirts at the net rate of 250 pieces per hour.

Pistons enter the machine from a conveyor, are radially located from their wrist pin holes and clamped on the ring land diameters. Four heads machine four piston skirts simultaneously. Air gaging follows the machining operation, after which pistons are ejected to another conveyor.

Write to Ex-Cell-O or contact your local representative for further information or a proposal.

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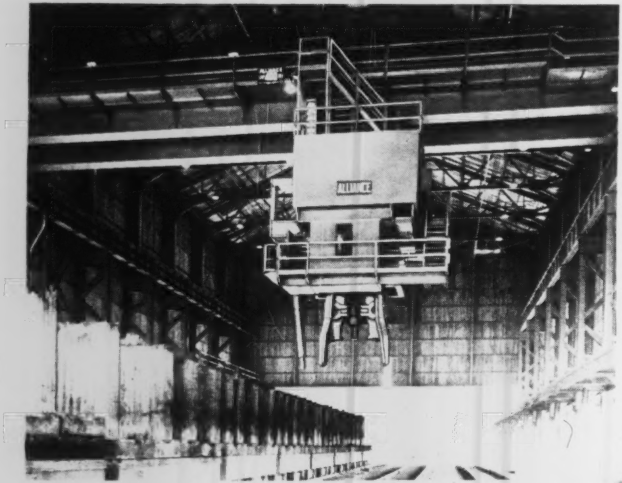

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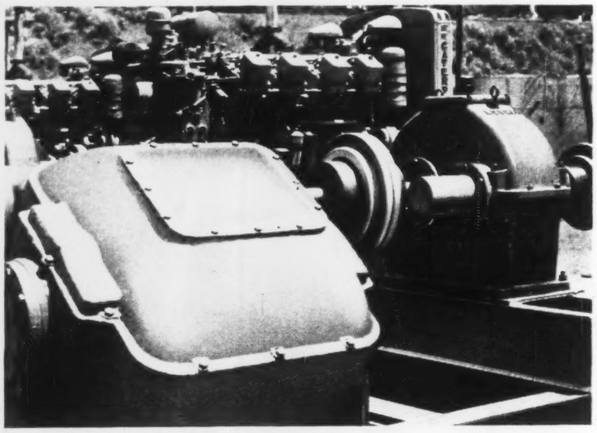
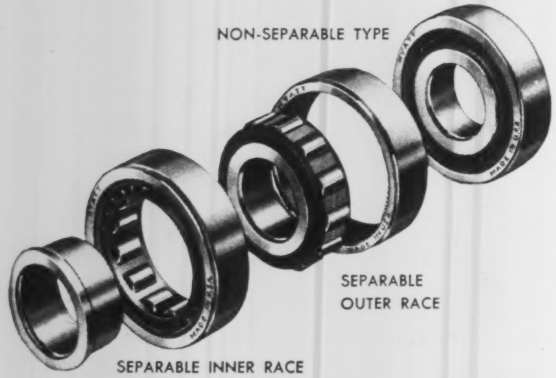
the more you need HYATTS . . . because you get more sheer load-carrying capacity with straight cylindrical roller bearings than with any other type. HYATTS give outstanding service in this 400-ton stripper crane.

THE HIGHER THE SPEED...

the more you need HYATTS . . . because carburized races, electronic control of eccentricity and internal clearances, and uncompromising final inspections assure smoother performance in speed reducers like this one.



THE MORE YOU NEED *Cylindrical* HY-ROLL BEARINGS



Loads are growing heavier, speeds are growing higher in many types of machinery today—and at the same time designers must often *reduce* overall size. Here's where HYATT Hy-Rolls have it all over limited-capacity bearings—especially when you eliminate either inner or outer races of separable HYATTS and operate the rollers directly on the hardened and ground shafts or housing bores. It's a smart way to save added space without sacrificing load capacity. Ask your nearest HYATT Sales Engineer for recommendations. Hyatt Bearings Division, General Motors Corporation, Harrison, N.J.; Pittsburgh; Detroit; Chicago; and Oakland, California.

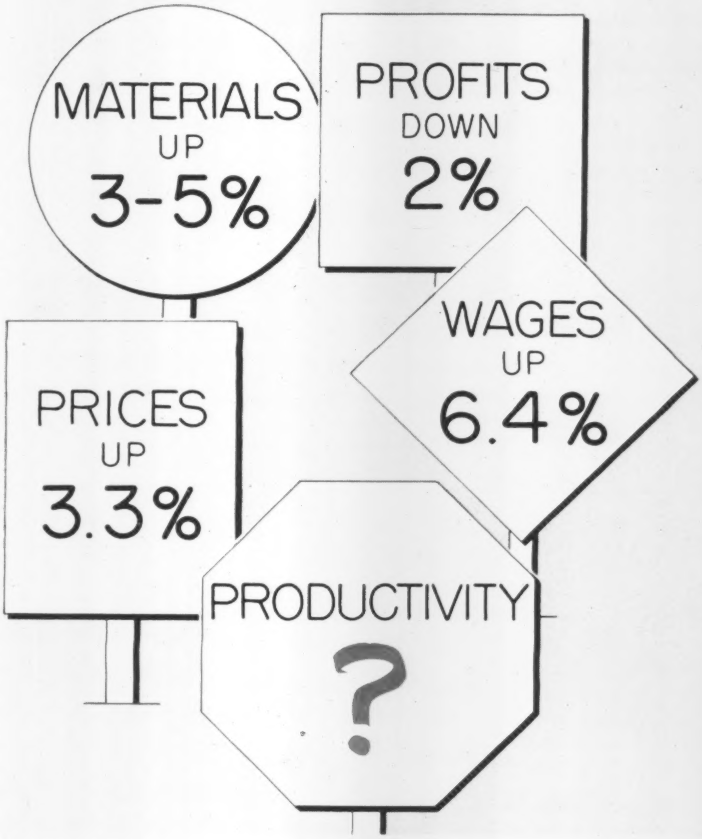
THE RECOGNIZED LEADER IN CYLINDRICAL BEARINGS

1908–1958
FORWARD FROM FIFTY

HYATT HY-ROLL BEARINGS FOR MODERN INDUSTRY

What's Ahead for '58?

(Auto industry's prospects, vs. '57 pace)



Detroit Aims at Productivity

The auto industry strains for greater efficiency. Otherwise, it sees profits sliding steeply in 1958. Higher labor costs look to be inevitable, strike or no strike in June

IMPROVEMENTS in productivity will be sought by automakers in 1958. The question is: Will more efficient manufacturing methods make up the difference between sharply increased costs and moderately higher prices?

Plusses—Higher sales will help. L. L. Colbert, president, Chrysler Corp., predicts: "Retail sales of new cars during 1958 may rise above the 6-million mark." Other estimates peg passenger car sales around 6 million units, compared with preliminary reports of 5.8 million car sales in 1957.

Truck sales in '57 have been estimated at 1.08 million units. This year should see about the same number marketed—possibly more as the federal road building program picks up a little speed.

Car builders also report they'll be spending less on plants and equipment ($1.04 billion is the anticipated figure), although tooling costs will be about the same as last year's ($700 million).

Minuses—As the charts (at left) indicate, material and labor costs will be higher. So will indirect costs. Detroit has already raised the prices of its 1958 cars an average of 3.3 per cent above last year's, but the industry claims the hikes won't cover increases in expenses—even if sales are higher.

Several auto executives have told STEEL they expect pretax profit returns on investments to drop 2 to 5 per cent in 1958. To hold the profit line, car builders will try to get maximum production per manhour from plant and equipment. They'll also fight hard to keep down labor and material costs.

Labor Looms Large

Under the leadership of Walter Reuther, the United Automobile Workers will be out to get the biggest wage package possible. Contracts expire June 1, and car companies are ready to fight back even if it means a strike.

The union is expected to have almost $50 million in its strike kitty by spring—twice the amount it had when contract talks opened in 1955. Chances of a walkout are 50:50. General Motors Corp. looks like the UAW's first target. (See STEEL, Dec. 2, 1957, p. 53.)

Although more details will be known after the union's contract demand-setting conference late this month, Mr. Reuther and his cohorts want to catch up with the steelworkers. Their average wage now is $2.71; the autoworkers' average gross hourly pay is $2.47.

Other union demands will center on two-year contracts, premium pay starting at 32 instead of 40 hours, and separate contracts for skilled workers. Chrysler Corp. will come in for its own brand of bargaining. Norman Matthews, who heads up the union's Chrysler

Plant & Equipment Spending

(Millions)

1958*	$1,040
1957	1,302
1956	1,689
1955	1,128

*Estimated. Does not include new model tooling
Sources: Auto Manufacturers Association, Department of Commerce.

U. S. Car Production

(Thousands of units)

	1958*	1957†	1956
GM	2,880	2,838	3,062
Ford	1,800	1,889	1,669
Chrysler	1,080	1,237	870
AMC	150	112	104
S-P	90	74	96
Totals	6,000	6,150	5,801

*Estimated.
†Projected.
Source: *Ward's Automotive Reports.*

Div., will seek a right-to-strike-against-transfer clause.

For every penny automakers can save on direct labor costs, they'll be able to save an equal amount on indirect labor. That's why the industry will take a strike to hold UAW wage demands to a minimum.

Plant, Equipment Spending Off

The big round of plant expansions is over, but some facilities under construction in 1958 will be keys to the industry's future thinking.

Typical—Chrysler's St. Louis assembly plant is typical of the ideal assembly layout. The 1.3 million sq-ft facility is expected to be in operation by 1959.

The industry now figures the most efficient assembly plants cover 1 million to 1.5 million sq ft on 200 acres. They are one-story layouts with a partial second story for painting operations or office space. Employment runs about 3500. Future assembly plants will follow this pattern.

Trends — Chrysler's Trenton, Mich., engine plant and Chevrolet's aluminum foundry in Massena, N. Y., will also be in the spotlight. The Trenton operation will point up advantages of partly automated equipment that can outproduce the pushbutton engine plant Chrysler built in Detroit in 1955.

Chevrolet's Massena facility is being built next to Reynolds Metals Co.'s reduction plant. It will feed molten aluminum directly to diecasting machines in the Chevrolet plant. Several new concepts of molten metal transfer are expected to be introduced at Massena. The experience the GM division gains may come in handy if it moves toward aluminum engine blocks in a few years.

Automakers will use more automation in 1958—but only where it can produce quality parts quickly enough to make the investment worthwhile.

Tooling—The industry will also pay more attention to the standardization of machine tool components of each machine tool builder. It is a first step in the building block program introduced by Ford Motor Co. It makes for quick interchangeability and longer machine tool life which tend to keep down equipment expenditures. (See STEEL, Nov. 4, 1957, p. 67.)

Materials Hold the Line

Automotive consumption of steel will be about the same as last year's, or slightly higher. Present figures show the industry used about 16.6 per cent of all steel produced last year, or 13.5 million tons. In 1956, car builders used 17 per cent, or 14.1 million tons.

To cut weight, the industry is expected to use slightly more aluminum The average 1958 car contains 44.9 lb, reports Kaiser Aluminum & Chemical Sales Inc., Chicago. Its 1957 counterpart used 39.6 lb. If 6.3 million cars are built, 283 million lb of aluminum will be used by the industry in 1958, vs. 241.5 million lb in 1957.

Partmakers will probably see more diecast and extruded parts in 1958 production—and in 1959 programs. Suppliers that fabricate such parts can expect a year similar to 1957. Stampers may see car companies bring more of this business into their own plants.

To keep themselves solvent, partmakers will continue to diversify into nonautomotive fields. The trend is to electrical components and small stampings for household furnishings. More Detroit area firms are looking for business from missile contractors.

As a result of diversification by partmakers and decentralization by car builders, the Automotive Parts Manufacturers' Association may be disbanded. Its members feel the organization no longer serves as a clearinghouse and sounding board for companies that have only 30 per cent of their work in the automotive business.

Frank Rising, executive secretary, APMA, hasn't officially commented, but member companies will decide late this month whether they'll disband or reshape the APMA into an organization with a broader base.

In any case, partmakers will face the same squeeze as the companies they supply. Total business apparently will be higher, but profits may be down.

The Big Sell

Each auto division is readying all the merchandising tricks it has to capture its share of the 6-million car market.

Companies will be looking for more ways to hold dealers to their orders for cars so scheduling can keep pace with production. If the market stays soft, dealer discounting will probably start early in the second half. So far, the industry doesn't think such tactics will be necessary.

More stories about automotive supermarkets will be cropping up this year. More and more big car dealers are already starting to carry second lines built by foreign producers or competitive manufacturers. Current reports center on dealers handling General Motors lines who are taking on American Motors' Rambler franchises.

Again the industry faces a rapidly expanding foreign car market which can rob it of possibly 250,000 sales. Last year's imports are

FACTS

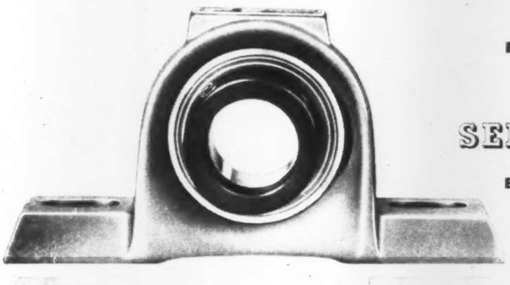
NEW DEPARTURE PILLOW BLOCKS—BUILT FOR LOWEST MAINTENANCE

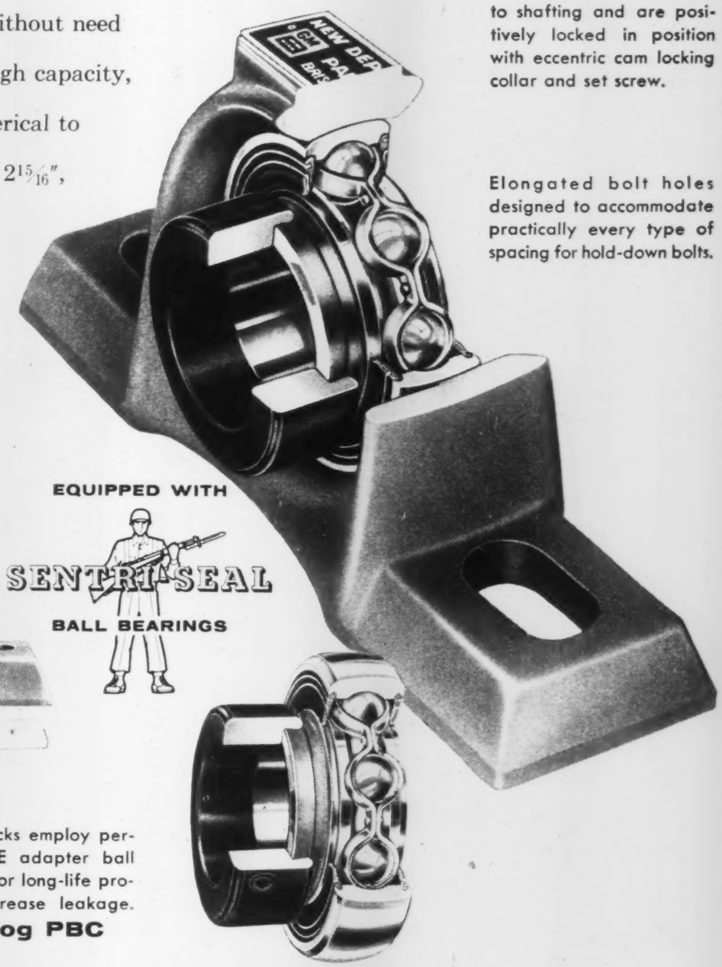
- New Departure adapter ball bearings are sealed and lubricated for life.
- Design is compact and rigid—fits easily in limited space.
- No grease nipples or other protruding lubricating fixtures needed.
- Pillow blocks are easily mounted without need for any special tools.
- New Departure ball bearings are high capacity, precision-built for long life.
- Bearing and block surfaces are spherical to accommodate any misalignment.
- Thirty-two shaft sizes, $\frac{1}{2}''$ through $2\frac{15}{16}''$, for wide variety of applications.
- Interchangeable with most other makes of pillow blocks.

Bearings are easily applied to shafting and are positively locked in position with eccentric cam locking collar and set screw.

Elongated bolt holes designed to accommodate practically every type of spacing for hold-down bolts.

Mounting pads are furnished with each New Departure Pillow Block to assure easy interchangeability with all pillow blocks having a high base-to-center dimension.





EQUIPPED WITH

SENTRI-SEAL

BALL BEARINGS

New Departure Pillow Blocks employ performance-proved Type AE adapter ball bearing with Sentri-Seals for long-life protection against dirt or grease leakage.

Send for Catalog PBC

1908–1958
GM
FORWARD FROM FIFTY

NEW DEPARTURE

DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BALL

you can cut
your
GLOVE COSTS

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COST-REDUCTION
Analysis

with the authorized
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PLAN

1 Jomac will analyze your working conditions and glove requirements
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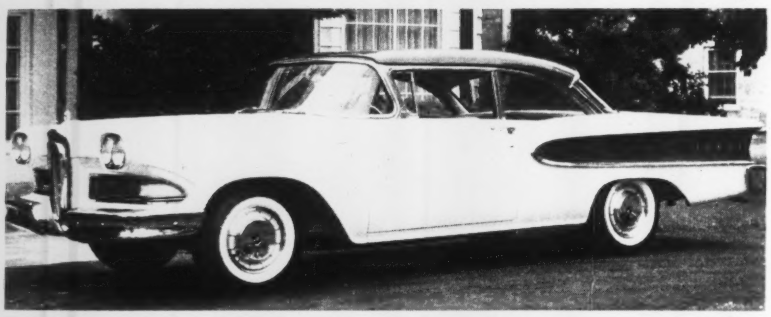
3 Test and compare the Jomacs with your present gloves—and the net cost figures speak for themselves

Your glove costs *can* be reduced. To make *profitable* use of this plan, write to Jomac Inc., Dept. E, Philadelphia 38, Pa., and say "Reduce my glove costs."

JOMAC
INDUSTRIAL GLOVES
Plants in Philadelphia, Pa., and Warsaw, Ind.
In Canada: Safety Supply Company, Toronto



EDSEL . . . It's a problem child for Ford as early sales lag.

BUICK . . . Its showroom performance is indifferent, too.

estimated at 204,000 units. By early 1959, somebody may decide it will pay to build a small car in this country.

In a year of mild optimism, each auto company has its special problems. Here's a brief rundown on areas of interest in each outfit.

Ford's Edsel Problem

Ford Motor Co. wants to know if Edsel will float or flop. So far, some 60,000 have been built. It is reported that 30,000 have been sold. Richard Krafve, division general manager, is still convinced the car will meet the first year sales goal (200,000).

The medium-price market will be soft in '58, and the Edsel is competing with twice as many cars as any of the low-priced jobs. The industry thinks Edsel's real test will come in 1959—after the novelty has worn off.

Ford took Chevrolet in '57 by about 40,000 units, but it doesn't look like it can repeat this year. The Ford Div. sank $190 million into 1958 changes. The GM division reportedly spent over $300 million. Ford's extensive changes hardly show and autodom's feeling is that Chevrolet has another winner. Productionwise, as 1957 closed out Ford was running at a 35,000 weekly rate, Chevy at 40,000.

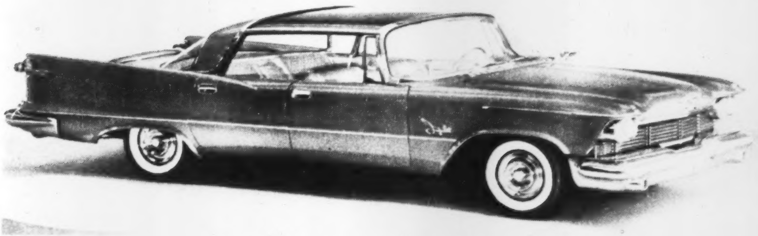
Here's Ford's 1958 outlook: Edsel will be pushed hard to make 200,000 sales. Look for slight slips in Lincoln and Mercury shares of the market. Look for Ford to drop back to second place, behind Chevrolet.

Question: Will Ford's four-seated Thunderbird, due out shortly, be as popular as the discontinued two seater? In three years of production, Ford sold 53,000, two-seated T-Birds.

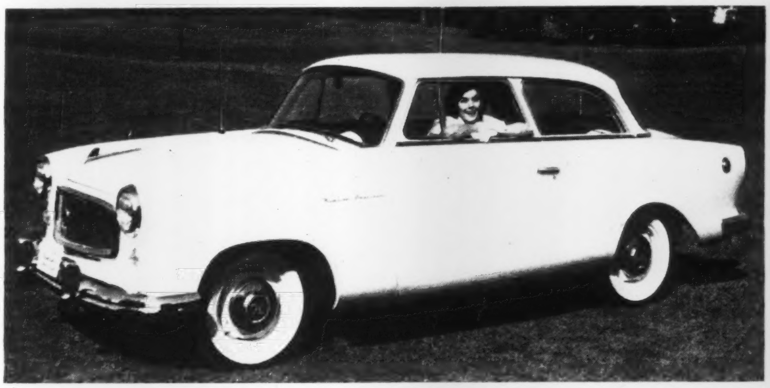
Buick Needs a Boost

Buick looks like GM's big problem again this year. The Flint, Mich., division apparently hasn't come up with enough changes to insure a real run on sales. January production has been cut 22 per cent below December levels on the basis of poor showroom performance.

GM faces no problems with Chevrolet or Cadillac. Last year,



IMPERIAL . . . Sales good for all Chrysler lines despite stand pat styling.



RAMBLER AMERICAN . . . AMC's little car bids to win economy buyers.

Chevrolet produced about 1.4 million cars to take 24.3 per cent of the market. Cadillac turned out 155,000 units for 2.5 per cent. Both divisions are expected to increase their percentage of market penetration in 1958. James M. Roche, Cadillac's general manager, estimates his division will sell 155,000 cars this year.

Look for increases from Pontiac and sales equal to 1957's from Oldsmobile.

GM seems to be in fair shape to take 48 per cent of the 1958 market, vs. 46 per cent last year.

Question: Harlow Curtice, GM's president, is due to retire in August. Who will replace him? Or will the board ask him to stay on?

Chrysler Stands Pat

Chrysler wants to know: "Will the Forward Look still sell in '58?" The company staged a terrific comeback last year, taking 20 per cent of the market, vs. 15 per cent in 1956.

Changes this year have been minor. In fact, the company plans to stick with the '57 body for three years. So far, buyers don't seem to be shying away. The company figures it should take at least 17.5 per cent of the market in '58. It may hold even with its 1957 pace.

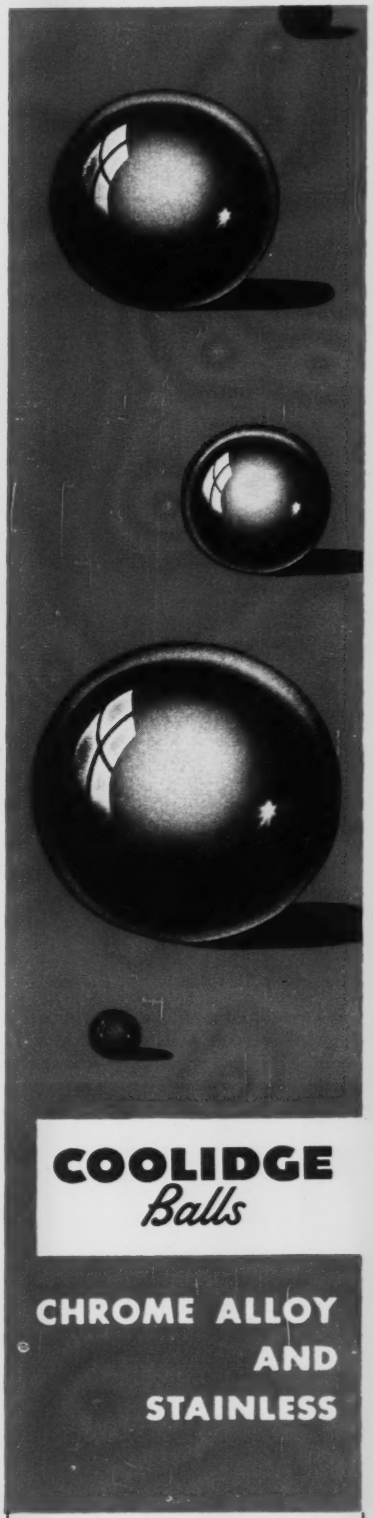
Production will be a bigger problem than sales. Chrysler still hasn't licked the real causes behind the rash of wildcat strikes inflicted on it by the UAW last year. It is the last automaker with most of its employment centralized in the Detroit area. The union doesn't want to lose this organized strength by having the company decentralize, so it's putting up roadblocks in the form of walkouts to protest work standards and transfer rights. This will be a key problem for Chrysler in contract negotiations this spring.

Revival for AMC

American Motors Corp. is fulfilling all the promises made by George Romney, president. The company is in the black and apparently will stay there through 1958.

The Rambler economy pitch has found a receptive audience, and latest sales reports indicate the company has sold more than 30,-

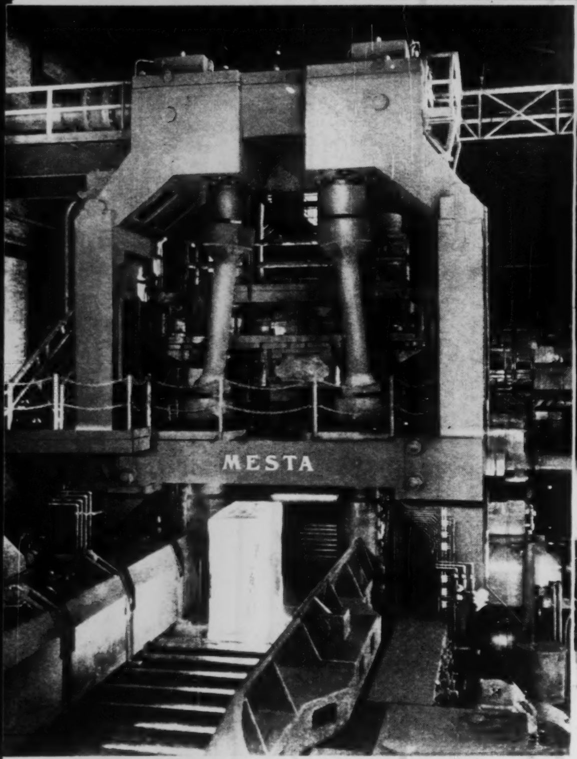
(Please turn to Page 146)



COOLIDGE
Balls

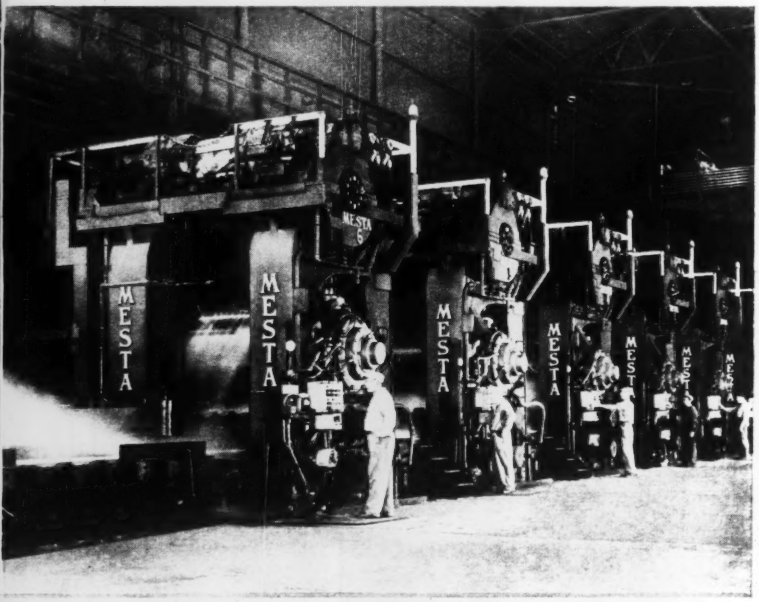
CHROME ALLOY AND STAINLESS

COOLIDGE CORPORATION
MIDDLETOWN, OHIO

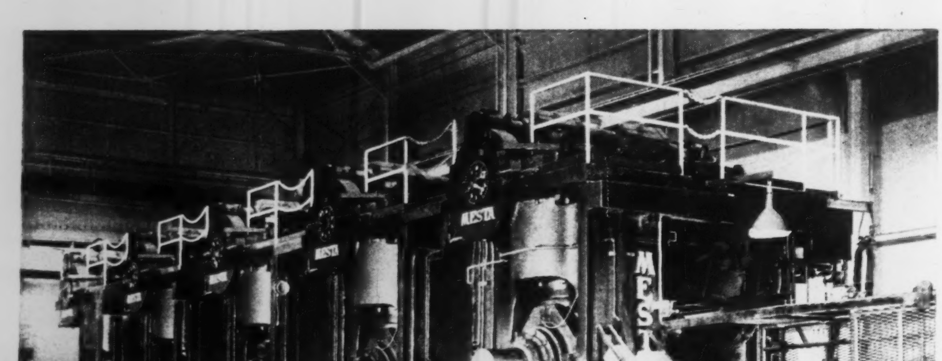


Rolling 20 Ton Ingots into Slabs
on a MESTA 45″ x 90″ Universal
Reversing Slabbing Mill

MESTA 60″ Four-High Hot Strip Mill Finishing Stands



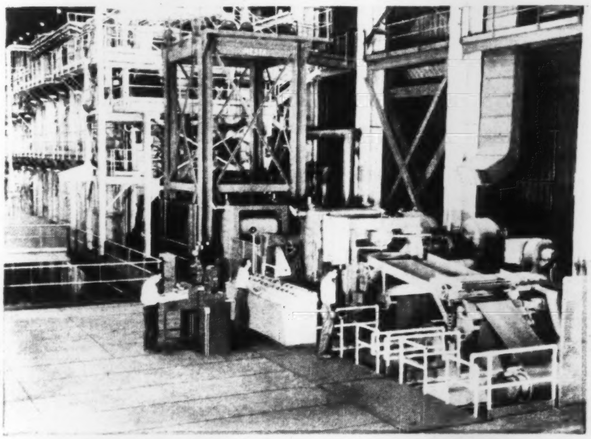
MESTA

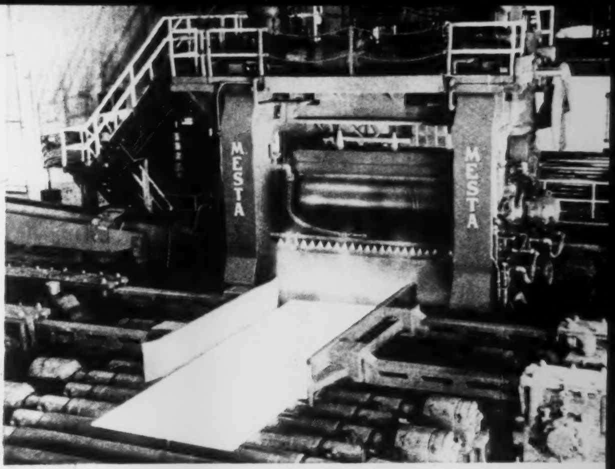


MESTA 48″ Four-High Five Stand
Tandem Cold Mill Rolling Strip
Steel for Tin Plate in Coils

MESTA
THERE IS NONE BETTER

MESTA 2000 FPM Continuous Cleaning and Annealing Line for Steel Strip in Tin Plate Gauges with Pay-Off Reels, Mash Welder, and Tension Reels





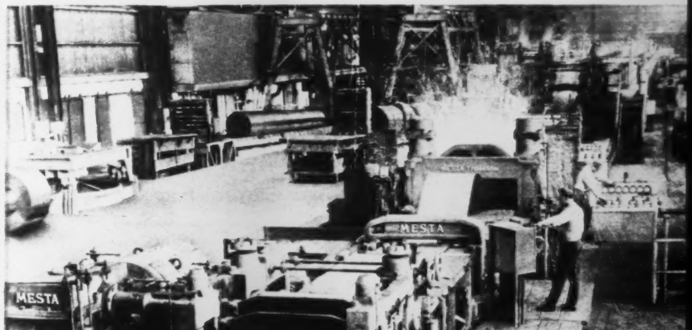
MESTA 160″ Four-High Reversing Plate Mill

Two MESTA 48″ Continuous Galvanizing Lines with Feed Reels, Straighteners, and Mash Welders

MESTA 60″ Sheet Shearing Line with Trimmer and Combination Rotary Flying Shear and Leveller

Designers and Builders of Complete Steel Plants

MESTA 48″ Continuous Pickling Line with Primary and Secondary Processors, Flash Welder, Up-Cut Shears, Side Trimmer, and Up-Coiler



MESTA MACHINE COMPANY
PITTSBURGH, PENNSYLVANIA

PACKARD HAWK . . . Packard returns after a six-month absence.

(Concluded from Page 143)

000 cars since its fiscal year began on Oct. 1.

AMC's Rambler American came out last week, giving the company sales ammunition to use against foreign imports and large cars alike. Mr. Romney predicts 160,000 sales in fiscal '58, or 2.7 per cent of a 6 million car market. Last year, its share was 1.8 per cent.

The American will sell for less than $1800 (advertised delivered price). Overdrive and automatic transmission are optional. The car has a 100-in. wheelbase and an over-all length of 178.25 in. Its inline, 6-cylinder engine will average 36 mpg at 40 mph. Mr. Romney hints AMC may revive the station wagon model in this series if sales go well.

Question: Will financier Louis Wolfson, majority stockholder, be content to take modest increases in the value of AMC stock, or will he liquidate some divisions and claim tax credits, too? September, 1958, might be the time Mr. Wolfson makes his move.

Crisis for Studebaker-Packard

Studebaker-Packard Corp. must make its economy Scotsman pay off this year or it will be in big trouble. S-P's share of the market last year was 1.23 per cent, compared with 1.68 in 1956.

Curtiss-Wright Corp., which is managing Studebaker-Packard affairs, still holds a stock option on 5 million shares. The option expires this year, and C-W may pick it up. Roy Hurley, C-W president, reportedly has stated he likes the idea of being in the auto business.

This is the year he has to come up with products or plans to keep the company alive. Otherwise, the firm faces a breakup which could turn its dealers into distributors for German-built Daimler-Benz products.

Question: Packard is supposed to reappear soon. Will it survive the 1958 model year after being out of showrooms for almost six months?

Prospects for 1959

While the 1958 sales race progresses, stories will be appearing about the 1959 models which are being tooled.

Chrysler's basic style will continue in '59, but the company reportedly is looking closely at unit body construction, rear end transmissions, and air suspension for 1960 or beyond. So 1959 shapes up as another facelift year for Chrysler cars.

Braking systems still need improvement. Engineers are expected to use more aluminum brake drums with cast iron liners—they're on Buicks now. Several firms are studying a liquid cooled brake system, but it's not expected to be approved because of its high manufacturing cost. The talk that car builders are going to 13 in. wheels has died out. The '59 cars now in the works have 14-in. wheels.

Ford is also keeping its basic body styles. Ford and Chrysler are reportedly ready to introduce innovations like alternating current electrical systems on '59 cars.

GM will bring out definite styling changes on Olds and Buick in 1959, and Chevrolet supposedly will be making major sheet metal changes the second year in a row.

Engine programs are scarce, say machine tool builders. Oldsmobile may have something on the fire for 1959, but other divisions seem to be sticking with present blocks since the need for higher horsepower has vanished.

Instead of plugging horsepower, the industry has turned toward economy. Simple, inexpensive fuel injection systems may help. Engineers are still seeking to debug present systems, so they'll be available at a reasonable price in 1959. Prospects are fair.

Shifts in Management

In 1958 automakers will strengthen and reorganize management structures.

Ford will be moving some of its key middle management people into more responsible positions to better bridge the gap between top executives and the next highest echelon. Men like Del Harder, executive vice president, will stay on until adequately trained replacements are available.

James J. Nance is on the spot this year. He'll have to show his reputation as a merchandiser is merited. The recently appointed head of the recombined Lincoln-Mercury Div. is expected to make more changes as he builds up his management staff.

Chrysler moved half a dozen young men into top staff positions when it reorganized its management team in 1956. Many are still growing into their jobs. This year will see some jockeying for positions on the central staff.

General Motors has ready replacements for all top jobs. Aside from Mr. Curtice, and possibly one division general manager, GM expects only routine management changes.

WHAT'S AHEAD...

in steel service and supply

New Steels—1958 will peak 1957 by the addition of scores of new sizes and types of steel. Stocked for ready shipment from strategically located Ryerson plants are such new products as:

- **Pre-painted Steel** . . . cold-rolled coils, in color choices, widths from ¾″ to 42″, gauges .006″ to .035″.
- **New Tubing** . . . hot finished carbon steel in wall thicknesses up to 1½″, O.D. sizes up to 12¾″.
- **Alloy Rebars** . . . reinforcing steel with high-yield point for space saving.
- **Alloy Plates** . . . hot rolled 8620 in 16 sizes, and hot rolled annealed 4140 in 19 sizes, thicknesses up to 5″, widths up to 84″.

These represent only a sample of the many additions in stock . . . and coming during 1958.

New Quality Safeguards—Already known for controls that protect you on every purchase, Ryerson is further revising and tightening its quality control program across the entire range of products. For example, new closer cutting tolerances are being established; specifications are being reviewed, and all phases of Ryerson service are being more exactly tailored to your needs.

Stepped-Up Service—To meet growing demand, new Ryerson plants have just been opened at Indianapolis and Charlotte . . . modernization and expansion programs are completed or under way at Los Angeles, Pittsburgh, St. Louis, Buffalo and Spokane.

1958 promises steel users further improvements in Ryerson plants and facilities. Delivery records, such as shipping five out of every six orders within 24 hours, and 60-minute emergency order handling will continue to assure you of getting exactly what you need *when* you need it.

As close as your telephone, you'll find a wider range of steel stocks . . . controlled high quality . . . dependable service that goes beyond the material itself. So, as you look ahead into 1958, it will pay you to include Ryerson in your plans.

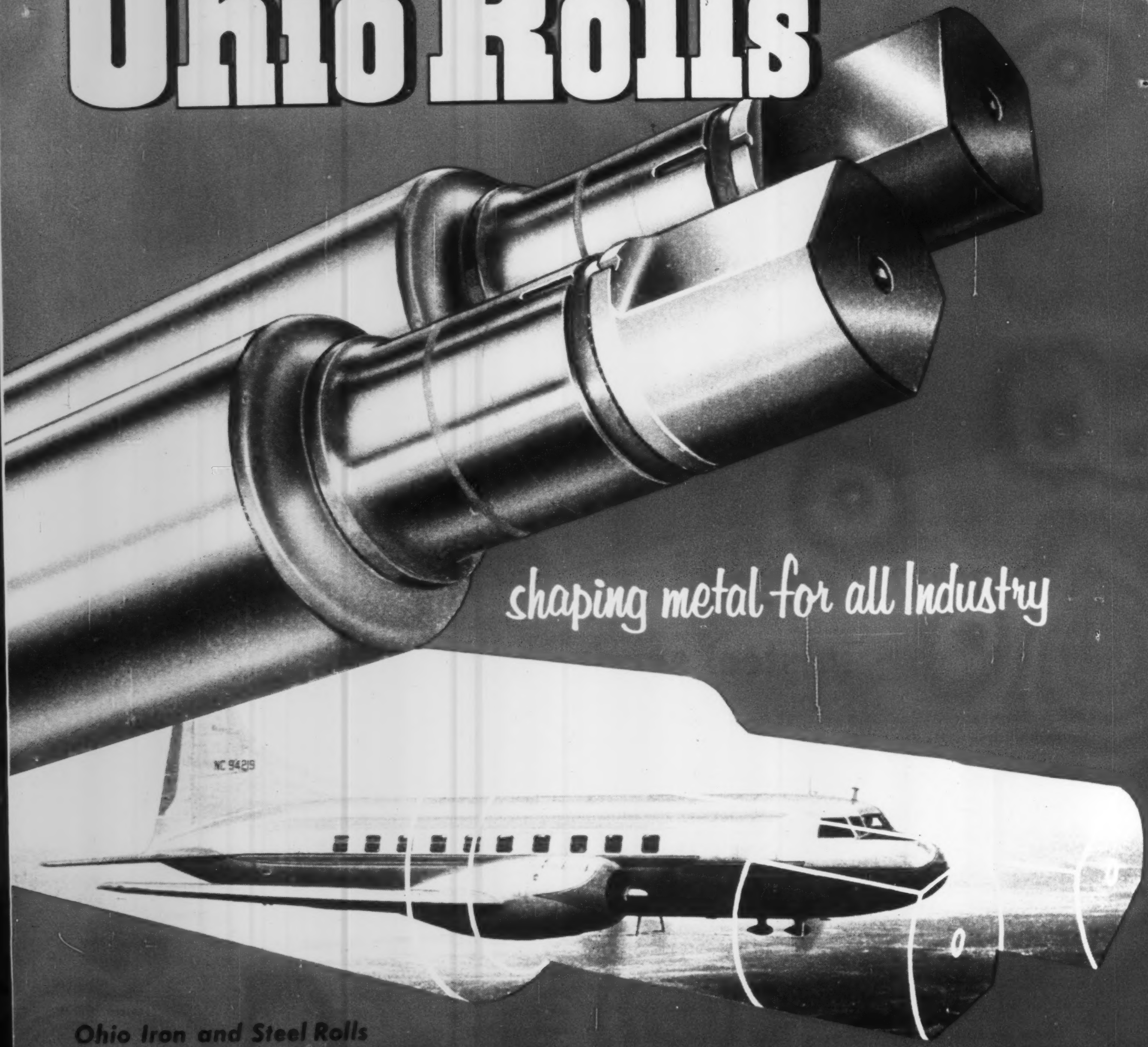
RYERSON STEEL

Member of the INLAND Steel Family

Principal Products: Carbon, alloy and stainless steel—bars, structurals, plates, sheets, tubing—aluminum, industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

Ohio Rolls



shaping metal for all Industry
NC 94219

Ohio Iron and Steel Rolls

Carbon Steel Rolls
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Flintuff Rolls
Double-Pour Rolls
Chilled Iron Rolls
Dense Iron Rolls

Nickel Grain Rolls
Special Iron Rolls
Nioloy Rolls
Forged Steel Rolls

THE OHIO STEEL FOUNDRY CO.
LIMA, OHIO

Plants at Lima and Springfield, Ohio

OR18

CECIL A. BRANGHAM
Republic div. sales mgr.

HAROLD FRYAR
Coleman dir.-manufacturing

FRANK L. BRUGGER
Kennametal product sales mgr.

J. D. HARMISON
Buda Div. sales mgr.

Cecil A. Brangham was made manager, tin plate sales division, **Republic Steel Corp.**, Cleveland. Former assistant manager, he succeeds **Lorne L. Caskey**, retired.

Harold Fryar, former general purchasing agent and assistant factory manager of **Coleman Co. Inc.**, Wichita, Kans., was appointed director of manufacturing. He replaces **W. L. Rowe**, who returned to Toronto, Ont., to resume his position of vice president-production, Coleman Lamp & Stove Co. Ltd. Mr. Rowe has been serving as acting director of manufacturing at Wichita.

Harry R. Bohme was made assistant purchasing agent at the Fontana, Calif., plant of **Kaiser Steel Corp.**

W. M. Terry Jr., chief engineer at the Pittsburgh Works of **Allis-Chalmers Mfg. Co.**, Milwaukee, was named to the new post of director of engineering co-ordination, responsible for the computer and standards section, industries group. **J. F. Roberts,** director of engineering, industries group, and a vice president of the company, has retired. **R. C. Allen,** director of mechanical engineering, now reports to the vice president in charge of the industries group. In addition to previous duties, Mr. Allen is responsible for consulting services in processing, welding, and other phases of engineering.

Thomas M. Hogan was made New Orleans district sales manager for **Jones & Laughlin Steel Corp.**

Frank L. Brugger was appointed product sales manager for metal-cutting tools, **Kennametal Inc.**, Latrobe, Pa. He represented the company in the Milwaukee area for more than eight years. Mr. Brugger succeeds **Roger M. McCray**, now Cincinnati district manager.

Consolidated Electrodynamics Corp. appointed **Walden E. Bradbury** Washington district sales manager to replace **Albert W. Brandmaier**, recently made manager of the European sales office, Frankfurt, Germany.

James S. Howard was elected assistant secretary, **Pittsburgh Steel Co.**, Pittsburgh. He was treasurer and secretary, Johnson Steel & Wire Co., Worcester, Mass., subsidiary, and is succeeded by **Wesley T. Holm.**

Carl C. Rigsby, factory manager, was made general manager, **Packard Electric Div.**, Warren, Ohio, General Motors Corp. He succeeds **B. N. MacGregor**, retired.

Vincent P. Blair was made general manager, **Delco Products Div.**, Dayton, Ohio, General Motors Corp., succeeding **Frank H. Irelan**, retired. Mr. Blair was comptroller, GMC Truck & Coach Div., Pontiac, Mich.

Walter B. Smith was named Milwaukee district sales manager, **Thor Power Tool Co.**, replacing **Clarence B. Bergren**, appointed manager, electric and Speedtool sales. **Theodore E. Vocker** replaces Mr. Smith at St. Louis.

J. D. Harmison was appointed sales manager, material handling, **Buda Div.**, Allis-Chalmers Mfg. Co., Milwaukee. He was manager, parts sales, for the tractor group.

R. L. Puette and **B. H. Carlisle** were appointed general divisional managers by **Clark Controller Co.**, Cleveland. Mr. Puette continues as vice president-operations. His group includes three new divisions: Automation, Crane & Mill Accessory Controls, Packaged Speed Control & Control Centers. Mr. Carlisle's group includes the present American Electric Switch and Renewal Parts Divisions, as well as the new Standard Products Div.

Dr. W. E. Hanford was appointed vice president for research; **Richard M. Furlaud**, general counsel, **Olin Mathieson Chemical Corp.**, New York. Since joining the firm last July, Dr. Hanford has been assistant to the president for research. He formerly was vice president of M. W. Kellogg Co.

C. D. Ramsden was named president and general manager, **Pacific Coast Engineering Co.**, Alameda, Calif. He was vice president-general manager.

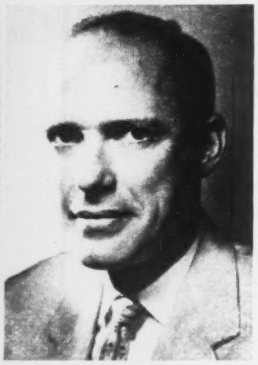
Harry E. McCain was promoted to plant manager, **Fyr-Fyter Co.**, Dayton, Ohio. He is succeeded as plant superintendent by **Lawrence Bruggerman.**

Jed J. Merrill, New England division manager, **A. M. Byers Co.**, succeeds **E. L. MacWhorter**, retired, as Philadelphia division man-

MEN OF INDUSTRY

LLOYD LEE
LeMaire Tool automation dir.

HERMAN W. STIEGLITZ
Thomson Elec. Welder v. p.



R. W. DAVISON
Armco sales director

FRANK EDWARDS
Patterson Foundry post

ERNEST L. ILSLEY
Kaiser Steel v. p.

DR. ERWIN G. LOEWEN
Taft-Peirce tech. dir.

ager. **Harry E. Thompson** fills the New England post at Boston.

Frank Edwards was appointed plant superintendent, ceramics division, **Patterson Foundry & Machine Co.,** East Liverpool, Ohio, subsidiary of Ferro Corp. He was manager, low voltage division, Knox Porcelain Co.

Ernest L. Ilsley was elected vice president, **Kaiser Steel Corp.** He continues as general manager of the fabricating division plants at Napa and Fontana, Calif. **J. R. Walker Jr.,** controller and assistant secretary, was elected vice president-controller.

Herbert Rubin was made head planning and estimating engineer, **Moffett Engineering Inc.,** Albany, Calif.

Davenport West Jr. was appointed a vice president, **Union Carbide Ore Co.,** division of Union Carbide Corp., New York.

Dr. Erwin G. Loewen was made technical director, **Taft-Peirce Mfg. Co.,** Woonsocket, R. I. Former staff engineer and director of machine tool production, he assumes responsibility for over-all plant quality control policy. **Franklin Meyer Jr.** was made assistant manager, small tool and gage division, in addition to duties as manager of the instrument gage division.

Robert T. Campion was named secretary of **Siegler Corp.,** Anaheim, Calif.

Trane Co., La Crosse, Wis., named **E. C. McLaughlin** purchasing agent, manufacturing division, in La Crosse; **L. A. Brewer,** purchasing agent for the Clarksville, Tenn., manufacturing division.

E. J. Cassella was promoted from assistant plant manager to plant manager, **Beaver Pipe Tools Inc.,** Warren, Ohio. **C. W. Shafer,** vice president-production, has retired.

Lloyd Lee was appointed director of automation for **LeMaire Tool & Mfg. Co.,** Dearborn, Mich. He headed a similar operation at Omer E. Robbins Co. for the last four years.

Herman W. Stieglitz was elected vice president, **Thomson Electric Welder Co.,** Lynn, Mass. He is in charge of engineering. He was formerly manager of sales and engineering.

R. W. Davison was appointed director of sales planning and coordination, **Armco Steel Corp.,** Middletown, Ohio. Former manager of sales in the Houston area for Sheffield Div., he is succeeded by **W. H. Leo,** who has been on leave from the division while serving as an official of the Department of Commerce in Washington. **D. W. Roberts** assumes Mr. Leo's former position as manager of sales for construction products in Kansas City, Mo. **E. L. Argo** was made manager, sales services, Houston plant. **A. D. Johnston** was made assistant sales manager, bolt products, Kansas City.

Raymond J. Severson, assistant general sales manager, **Ampco Metal Inc.,** was named manager of a new branch plant under construction at Garland, Tex.

Lucian L. Newberry was elected secretary-treasurer, **Mirro Aluminum Co.,** Manitowoc, Wis. He succeeds **Robert H. Fulton Jr.,** retired.

John H. Roy was made manager of aircraft sales, **Townsend Co.,** at Santa Ana, Calif. He recently joined Townsend's Cherry Rivet Div. in Santa Ana.

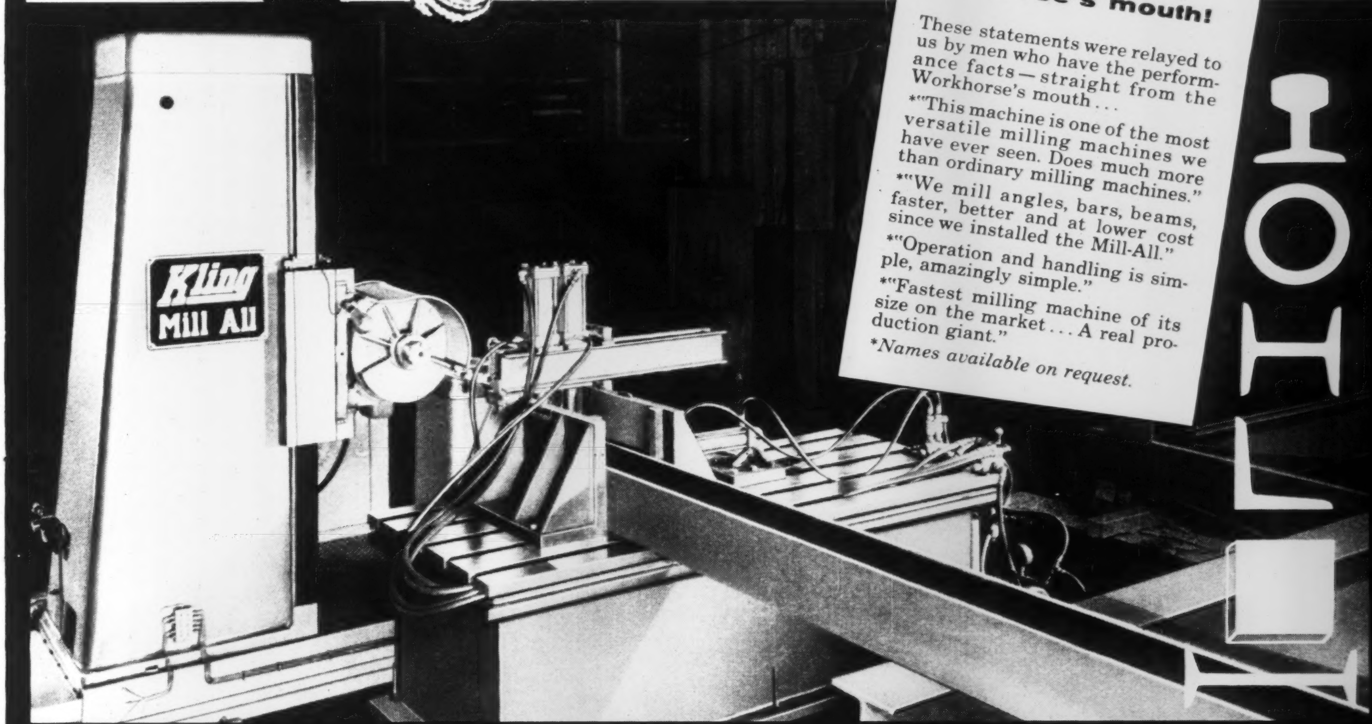
Meryl B. Draper was appointed general superintendent of the Wallingford, Conn., steel service plant of **Joseph T. Ryerson & Son Inc.**

Walter G. Seeger, chairman, **Whirlpool Corp.,** St. Joseph, Mich., has relinquished his position.

H. E. Edwards was made Milwaukee district manager for **Signode Steel Strapping Co.** He was assistant district manager.

Sanford M. Wasserman was made sales manager, **Mor-Flo Heater**

Kling Workhorses speak the language production men love to hear!



RIGHT out of the horse's mouth!

These statements were relayed to us by men who have the performance facts—straight from the Workhorse's mouth . . .

*"This machine is one of the most versatile milling machines we have ever seen. Does much more than ordinary milling machines."

*"We mill angles, bars, beams, faster, better and at lower cost since we installed the Mill-All."

*"Operation and handling is simple, amazingly simple."

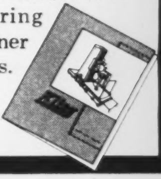
*"Fastest milling machine of its size on the market . . . A real production giant."

*Names available on request.

*We reduced actual milling time better than 50% with the Kling Mill-All

Savings in time of as high as 90% have been reported by men who have the performance facts . . . Reports from buyers, users and owners of the Kling Workhorse Mill-All milling machine, the Men Who Know, claim this machine to be the top value in its field. They'll tell you it has built-in versatility and power for facing structural steel shapes of all kinds.

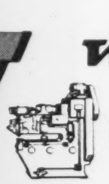
We'd like you to get these facts straight from the men who have the facts . . . *the performance facts* . . . We'll gladly send you a list of Kling Mill-All installations in your area. Write today for a list . . . and complete technical bulletin #MA-1. Kling Brothers Engineering Works, 1320 North Kostner Avenue, Chicago 51, Illinois.



This outline of average Mill-All cutting times on structural shapes will give an idea of the important time-savings that can be made with this machine. Depth of cut is ½" except for plate facing where depth of cut is ¼". Time given is for 1 cut.

TYPE OF WORK		TIME
H	4"—13 lb. B.S.	6 seconds
I	6"—12.5 I-Beam	8 seconds
H	24" x 12" x 100 lb. W. F. Beam	48 seconds
L	8" x 8" x 1" Angle	14 seconds
■	24" x 36" plate, face one side	8 minutes

Kling Workhorse Machines


Rotary Shears

Friction Saws

Punches

Combination Shear, Punch & Coper

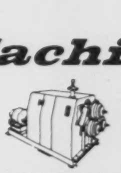

Angle Bending Rolls

Plate Bending Rolls

Export Distributors: Simmons Machine Tool Corp., 50 E. 42nd St., New York 17, N. Y. • Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.

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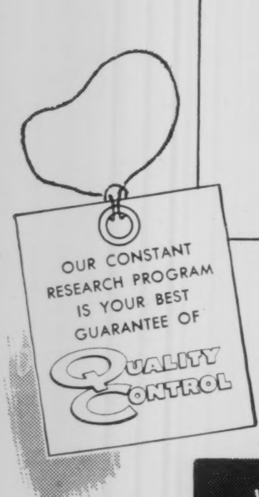
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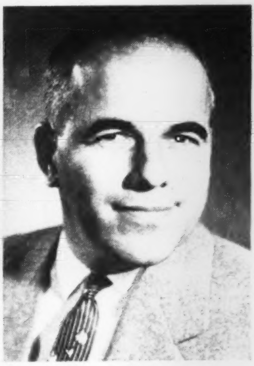
RICHARD T. TIEBOUT

Baker-Raulang sales dir.


WILLIAM H. HARRIS JR.

Micromatic Hone exec. v. p.

ROBERT S. ROSENAST

Beckman Instruments div. post

Corp., Cleveland. He was a sales supervisor for Kane Co.

Richard T. Tiebout was appointed director of sales, **Baker-Raulang Co.**, Cleveland, subsidiary of Otis Elevator Co. He replaces **G. B. Davis,** resigned. **Robert J. Laws** was named assistant director of sales.

Walter W. Finke was elected a vice president, **Minneapolis - Honeywell Regulator Co.**, Minneapolis. He continues as president, Datamatic Div.

Boris M. Wundt was named to the new post of turbine structural engineer for **General Electric Co.'s** large steam turbine-generator department, Schenectady, N. Y.

Elwood F. Blondfield, former supervisor of gas analysis instruments, **Beckman Scientific Instruments Div.**, Beckman Instruments Inc., Fullerton, Calif., was appointed product line manager of electrochemical and gas analysis instrument groups.

Lennox Tool & Machine Builders, Lima, Ohio, appointed **W. V. Trask** sales manager for its new line of products. The company expanded its operations to include items added through the purchase of the complete line of Baker sensitive drilling machine, and Tru-Edge contour shear from Baker Bros. Inc.

Joseph I. Andreini joined **Bucyrus-Erie Co.**, South Milwaukee, Wis., as manager of manufacturing. He formerly was vice president-operations of Pesco Products Div., Borg-Warner Corp.

William H. Harris Jr. was elected executive vice president, **Micromatic Hone Corp.**, Detroit. He was vice president-engineering. Mr. Harris succeeds **Don S. Connor,** newly elected president and general manager. **William J. Pinkerton,** vice president-manufacturing, was elected administrative vice president.

Crescent Metal Products Inc., Cleveland, appointed **Franklin P. Hayba** chief engineer; **Robert Hotaling** designer in the engineering department; **Norman G. Kreeger,** sales co-ordinator. They were formerly with Colson Corp.

C. A. Norgren Co., Englewood, Colo., elected **Edward H. Roos** vice president-engineering, production, and purchasing. He is succeeded as factory manager by **Richard L. Beach,** former assistant to the executive vice president. **James S. Machen** was made plant superintendent, a new post in the manufacturing division.

Robert S. Rosenast was made production manager of **Beckman Instruments Inc.'s** systems division, Anaheim, Calif. He was production manager for Clary Corp.

Stuart G. McGriff was made product manager, fuels and propellents, **Callery Chemical Co.**, Pittsburgh.

Herman Schroll was made Detroit branch manager, die supply division, **E. W. Bliss Co.** He was sales manager for Cambell Machines Co.

Virgil Pettigrew was made manager of estimating and controls for **Temco Aircraft Corp.**, Dallas.

Gerald J. Garvey retired as president, **Gary Screw & Bolt Div.**, Gary, Ind., Pittsburgh Screw & Bolt Corp.

James E. Burnett fills the new post of vice president and manager of operations at **Designers for Industry,** Cleveland.

William T. Gimbel was elected president, **Reliance Steel & Aluminum Co.** and **Reliance Magnesium Co.**, Los Angeles.

United States Steel Homes Div., U. S. Steel Corp., appointed **James C. McMichael** plant superintendent at Harrisburg, Pa., to succeed **Jules I. Delattre,** who was made assistant chief engineer of the division at Harrisburg. **George L. Dannenfelser,** former assistant plant superintendent at New Albany, Ind., was appointed plant su-

(*Please turn to Page* 156)

EDWARD H. ROOS

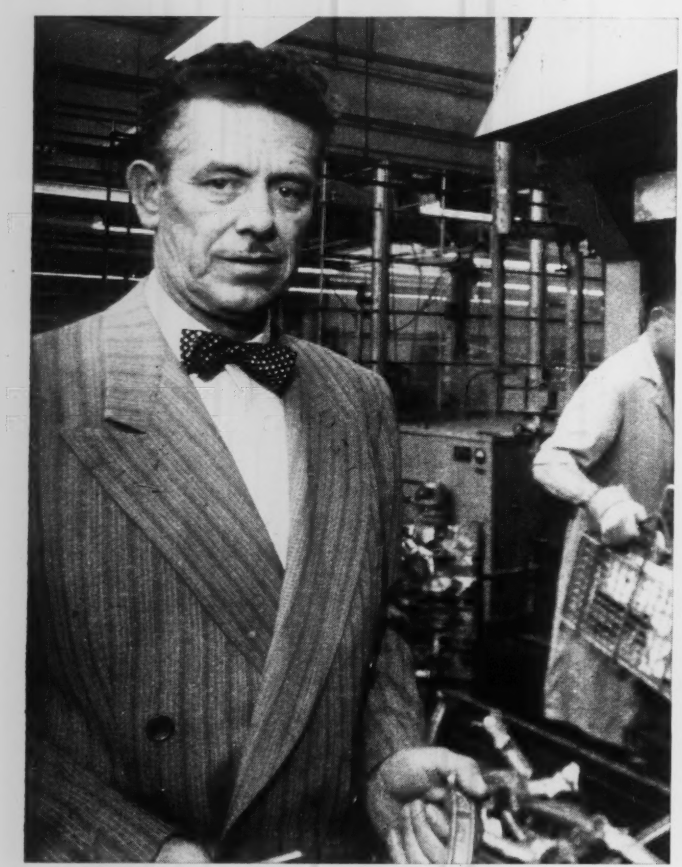
RICHARD L. BEACH

JAMES S. MACHEN

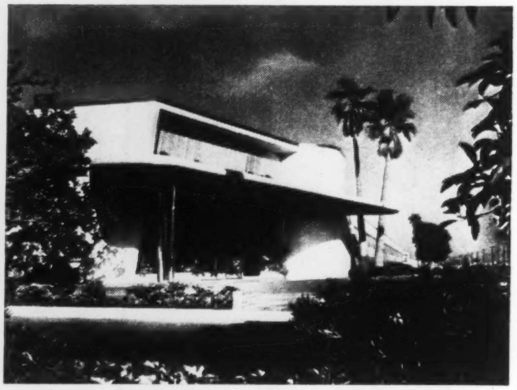
C. A. Norgren Co. executive positions

"We switched over to Columbia—so far we've saved $2,100

says Mr. Bernard Rosebrough
Plant Engineering Project Coordinator
McCulloch Motors Corporation
Los Angeles 45, California



"We'd tried four other degreasing solvents, so I have a real basis for comparison. For example, in the 22 weeks since putting in Columbia-Southern Trichlorethylene, we've cleaned out each of our six units just once. With all the other solvents used, our degreasers needed cleanout and fresh solvent every three weeks. We now make one changeover, instead of eight for the same period. Our net savings on man-hours for maintenance alone, without counting loss of production, adds up to $2,100.

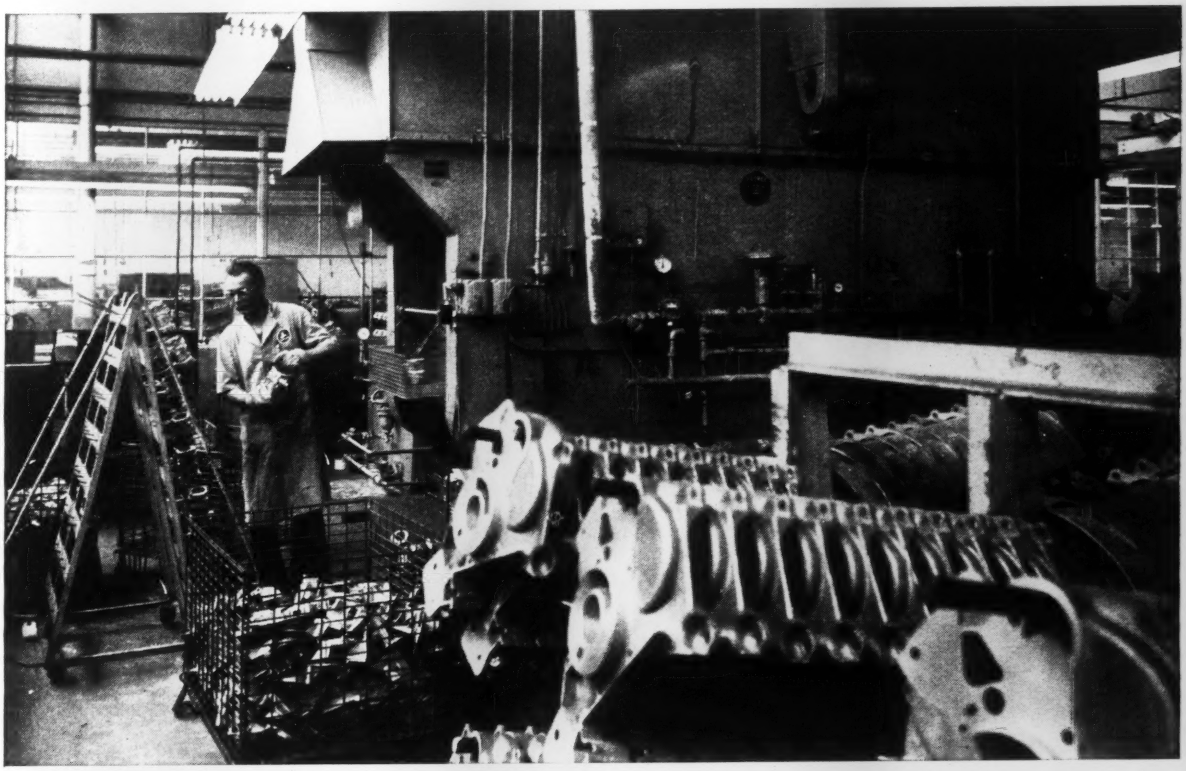


"Here's the plant, at 6101 West Century Boulevard. We produce our own line of McCulloch Chain Saws, Scott-Atwater Outboard Motors, Superchargers for custom cars, and four-cylinder drone engines for military target ships.

ULLOCH MODEL 55
GEARED FOR ACTI
55

"This is the Model 55, one of our most popular chain saws. We run magnesium, aluminum and steel parts through the degreasers in producing all of our saws and other products. That's one reason why we insist on high solvent uniformity and purity.

Southern Trichlor 22 weeks ago—just on maintenance alone!"



"Here's the 'big boy' of our six degreasing units. It's part of our sub-assembly operation. You can imagine what happens to production when it's shut down for cleanout. Figure two men for 16 hours to do a complete drain, clean, refill—see why I like a solvent that keeps a degreaser like this in action? Another big point. A year ago we had a fire in this unit that caused more than $6,000 damage. We believe that Columbia-Southern Trichlorethylene's stability makes it a safer solvent, and reduces fire hazard to a minimum.

"Look like I'm sold on one particular solvent? Well, how about this: Columbia-Southern's Trichlor lets us operate our units ten degrees higher than we felt safe in going with any other solvent tested here. You know what this means: more contaminant saturation, faster cleaning, less solvent used. And I like the dependable delivery and good servicing the jobber and Columbia-Southern's District Sales Office provide."

For more information, contact our Pittsburgh address or any of the fourteen Columbia-Southern District Sales Offices

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PITTSBURGH, PENNSYLVANIA

MEN OF INDUSTRY

THEODORE G. VICKERS
Ross Operating Valve post

WM. K. STAMETS JR.
heads Enterprise Co.

ELMER SCHWARTZ
Carpenter subsidiary post

perintendent of the Indiana operation.

Theodore G. Vickers was named plant manager of **Ross Operating Valve Co.**, Detroit. He was manager of manufacturing research and development for Kelsey Hayes Co. in Jackson, Mich.

E. F. Baker was named marketing manager, forgings, for **Kaiser Aluminum & Chemical Sales Inc.**, Oakland, Calif. Appointed to succeed Mr. Baker in Chicago as forgings product manager is **Byron B. Clow**, formerly assistant product manager, forgings.

Roy H. Smiles was appointed eastern regional manager for **Carrier Corp.'s** Unitary Equipment Div. at Philadelphia.

R. P. Lane was made assistant to the wrought products sales manager, **Dow Chemical Co.** With headquarters in Midland, Mich., he will supervise sales of magnesium sheets, plates, and extrusions for military use.

Carl F. Leitten was elected president and chief executive officer, **Electro Refractories & Abrasives Corp.**, Buffalo, to succeed **Grant S. Diamond,** now chairman. Mr. Diamond will devote most of his time to development of Spar-Mica Corp. Ltd., Montreal, Que., in which Electro Refractories has a substantial investment. He is its president; Mr. Leitten, a vice president. Mr. Leitten also is president of Electro Refractories & Abrasives Corp. Ltd., Cap de la Madeleine, Que., a subsidiary. He has been executive vice president of the parent company since 1955.

Wm. K. Stamets Jr. was elected president and general manager, **Enterprise Co.,** Columbiana, Ohio. He was chief engineer and sales manager. He continues as vice president of Wm. K. Stamets Co. and Stamets Export Co.

Irvan S. Dow was named manager of **Aluminum Co. of America's** Cleveland operations, succeeding **Hugh J. Morrison,** named assistant general manager, fabricating division, Pittsburgh. Mr. Dow was manager of Alcoa's Detroit works.

E. A. Bellande was elected vice chairman of **Garrett Corp.,** Los Angeles. A vice president since 1946, he joined the company in 1943 as assistant to the president.

Homer L. Marrs was appointed vice president and operations manager, **Motorola Communications & Electronics Inc.,** Chicago, subsidiary of Motorola Inc. He is succeeded by **Harold A. Jones** as vice president and midwestern sales manager.

Carpenter Steel of New England Inc., Bridgeport, Conn., newly acquired subsidiary of Carpenter Steel Co., appointed **Elmer Schwartz** general superintendent, production departments; **Walter A. Schlegel,** resident chief metallurgist; **James MacMinn,** superintendent of billet preparation; **Joseph J. Barrett,** assistant superintendent of hot rolling.

Harold Schulte was appointed manager of production engineering; **Herman Kretz,** assistant manager of production engineering, **Cooper Alloy Corp.,** Hillside, N. J.

Gerald C. Saltarelli was elected senior vice president of **Houdaille Industries Inc.,** Buffalo. He was vice president-manufacturing. **Daniel J. Kennedy,** Buffalo hydraulics division factory manager, moves to Akron, N. Y., to become assistant general manager, Wales-Strippit Co. unit of Houdaille. At Buffalo, **James P. Jennings** succeeds Mr. Kennedy as factory manager; **Ralph A. Braaten** becomes supervisor of standards. **W. L. Buckenhizer,** manager of Houdaille's Detroit division plant, was elected vice president-manufacturing, Houdaille Industries Ltd., unit at Oshawa, Ont. He is succeeded at Detroit by **T. E. Robinson,** former manager of the Chicago, North Chicago, and Decatur, Ill., divisions.

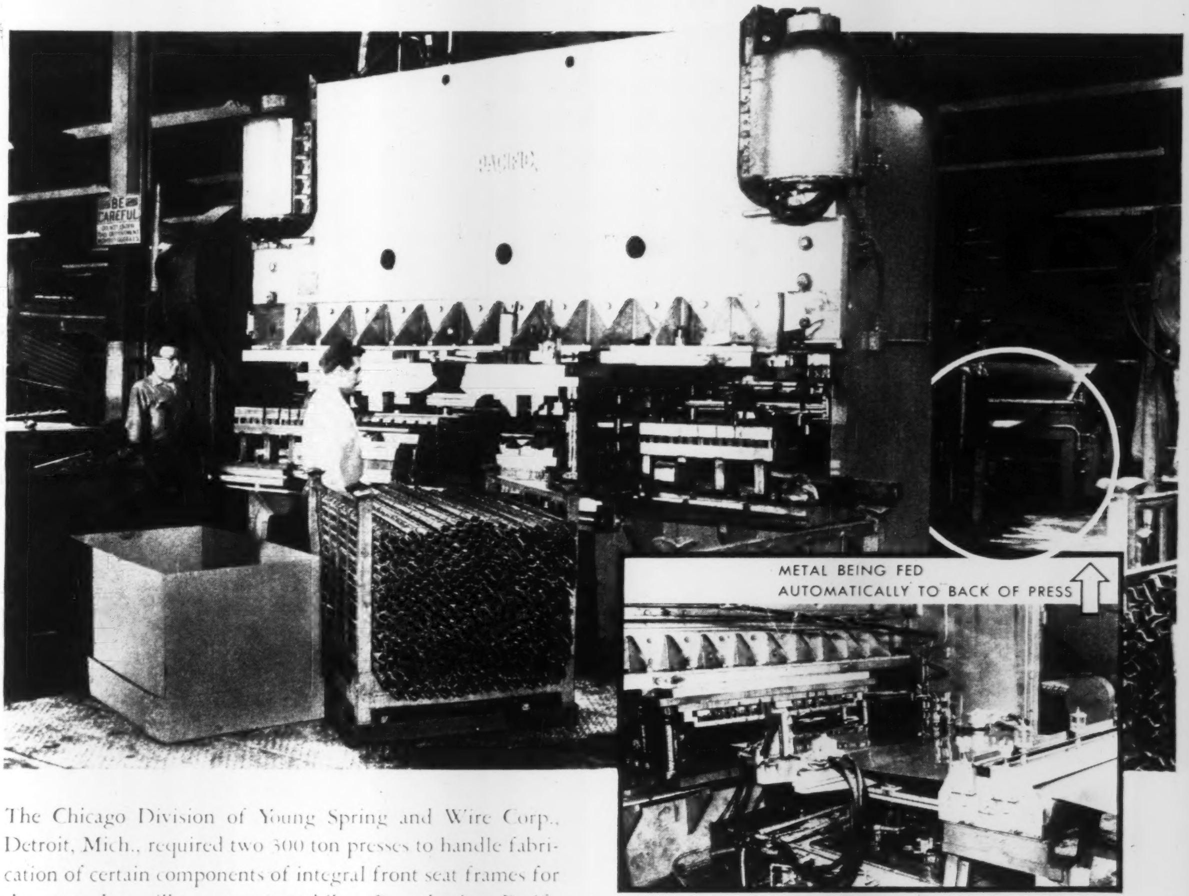
George E. McKewen was appointed product sales manager to direct marketing of the Barrymount line of industrial machinery mounts for **Barry Controls Inc.,** Watertown, Mass. He was sales manager, industrial division, Tracerlab Inc.

CARL F. LEITTEN
heads Electro Refractories

HOMER L. MARRS
Motorola subsidiary v. p.

GEORGE E. McKEWEN
Barry Controls sales mgr.

Hydraulic press brake reduces machinery and operational costs for forming large, heavy metal stampings



The Chicago Division of Young Spring and Wire Corp., Detroit, Mich., required two 300 ton presses to handle fabrication of certain components of integral front seat frames for the new, low silhouette automobiles. By selecting Pacific Hydraulic Brakes and using progressive dies coupled with an automatic material feeding system, it became possible to form major components of seat frames at each stroke of press. In a one-man operation, the first press stamps and forms the rear rail . . . the major component of the seat frame . . . from 57½" width material automatically fed through a 9-station progressive die from the back of the press to the front. The second press with two 4-station dies flattens and forms the ends of tubular material used for front seat, split-backs. Hydraulic system holds ram momentarily at the work to distribute tonnage evenly as punches enter material. Pressings are noiseless and extremely accurate.

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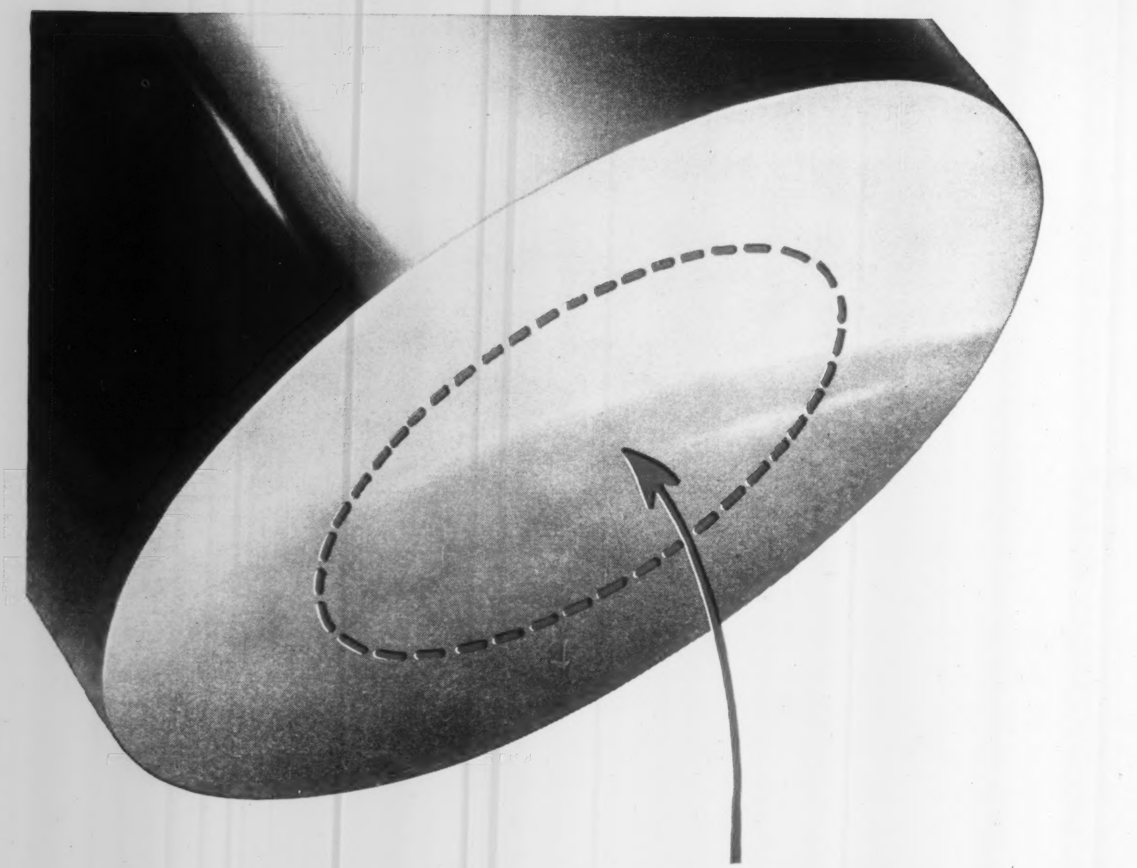

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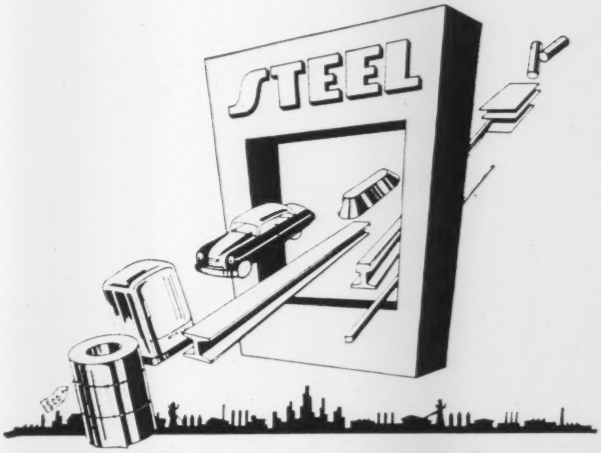

FACTS and FIGURES

of the metalworking industry

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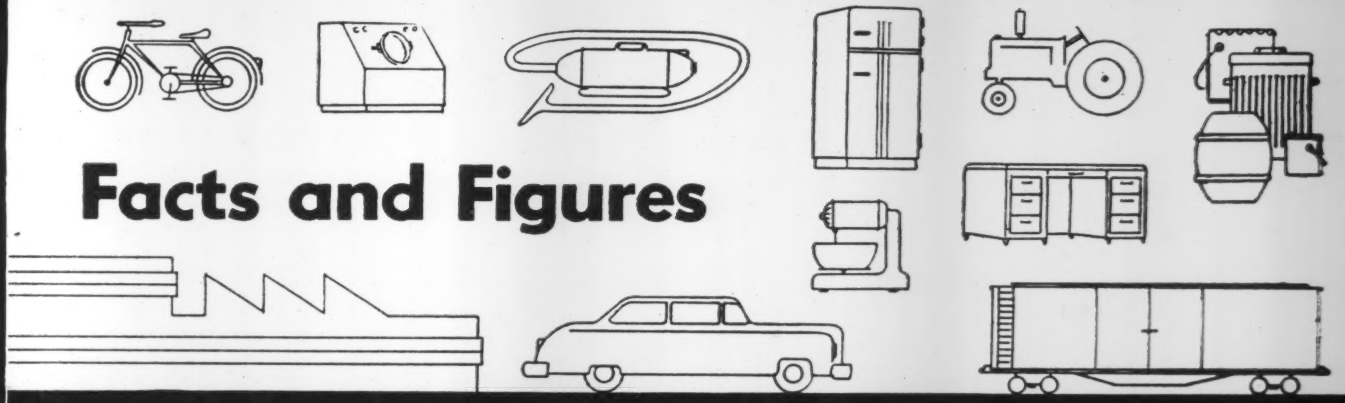

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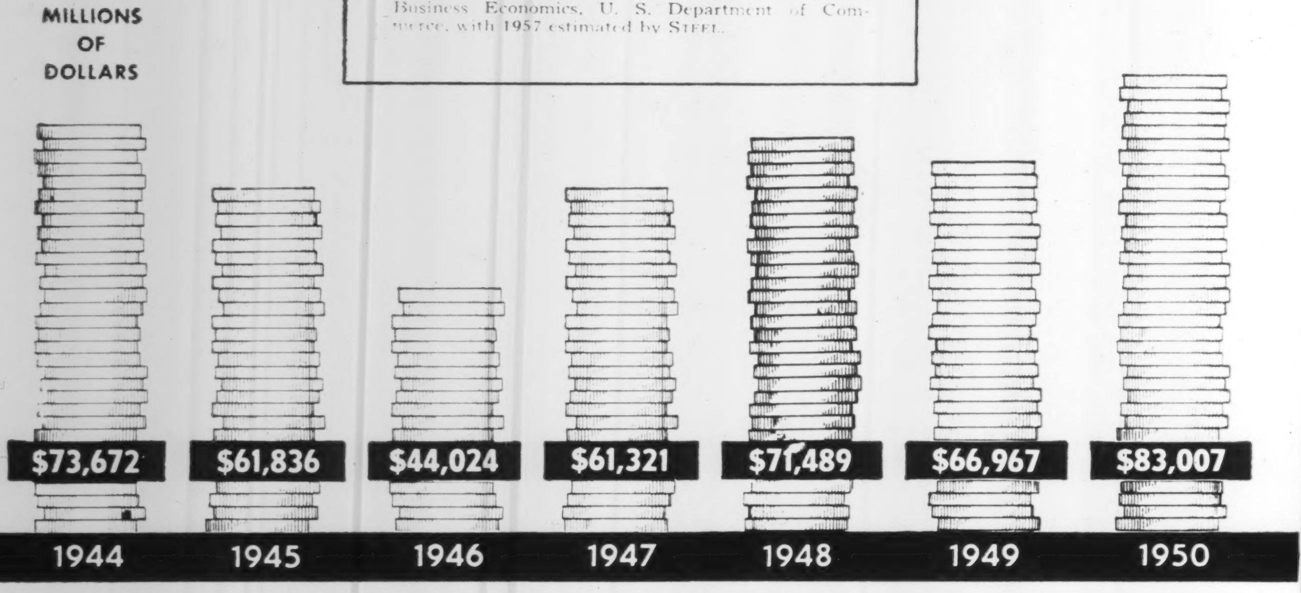
METALWORKING: *America's*

Manufacturers' sales in the metalworking industry again set a record—$140 billion in 1957. It is 4.8 per cent above the previous record—1956's $133,538,000,000. Ordnance is not included because the government does not reveal figures on it. But the classification accounts for only a small part of production for defense. Many defense items fall under other classifications, such as transportation equipment or instruments. Data are from the Office of Business Economics, U. S. Department of Commerce, with 1957 estimated by STEEL.



MANUFACTURERS' SALES IN METALWORKING INDUSTRY[†]

(Millions of Dollars)

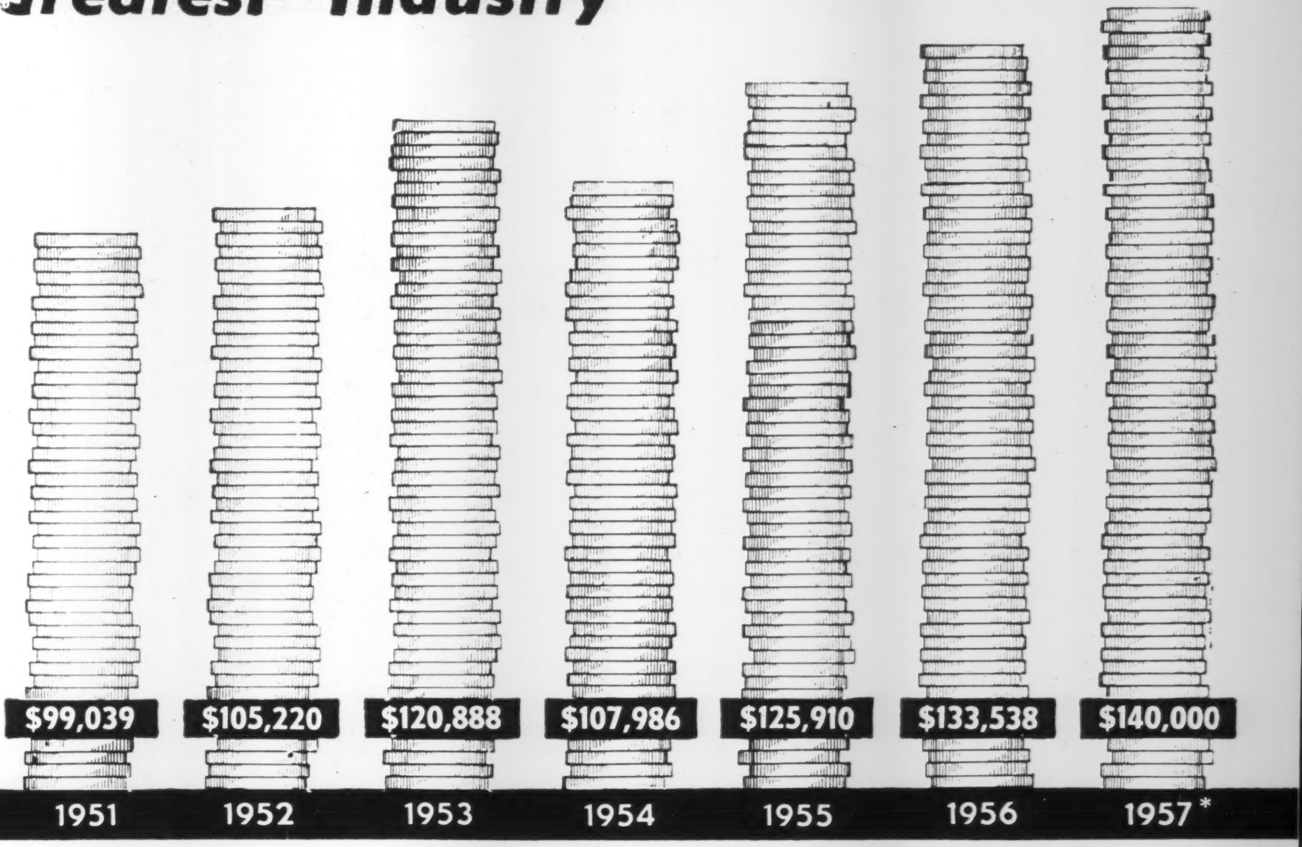
New Standard Industrial Classifications	Primary Metals	Fabricated Metal Products	Machinery	Transportation Equipment	Instruments	TOTAL Metalworking Industry
1957[*]	27,400	18,600	50,200	40,500	3,300	140,000
1956	28,339	17,683	47,856	36,037	3,623	133,538
1955	26,468	16,275	41,392	38,402	3,373	125,910
1954	20,106	14,712	38,497	31,615	3,056	107,986
1953	23,841	15,203	41,634	37,028	3,182	120,888
1952	20,725	13,625	38,402	29,582	2,886	105,220
1951	23,087	13,655	33,989	25,606	2,702	99,039
1950	19,046	11,710	27,114	22,651	2,486	83,007
1949	14,743	9,160	22,369	18,717	1,978	66,967
1948	17,153	10,200	24,618	17,475	2,043	71,489

Former Industry Group Classifications	Iron-Steel and Products	Nonferrous Metals and Products	Electrical Mach. and Equipment	Machinery Except Electrical	Automobiles and Equipment	Trans. Equip. Except Automobiles	TOTAL Metalworking Industry
1948	22,188	5,946	9,024	15,658	13,662	3,818	70,296
1947	19,172	5,633	8,299	13,697	11,478	3,042	61,321
1946	14,202	4,705	5,658	9,824	6,624	3,011	44,024
1945	16,812	4,463	6,302	11,640	11,446	11,173	61,836
1944	17,795	4,755	7,104	12,907	15,096	16,015	73,672

[†] Figures for 1948 and later represent a shift to the Standard Industrial Classification system. Data for 1948 are presented on the old industry group classification as well as the new. Figures for 1948 and later are not adjusted for seasonal variation.

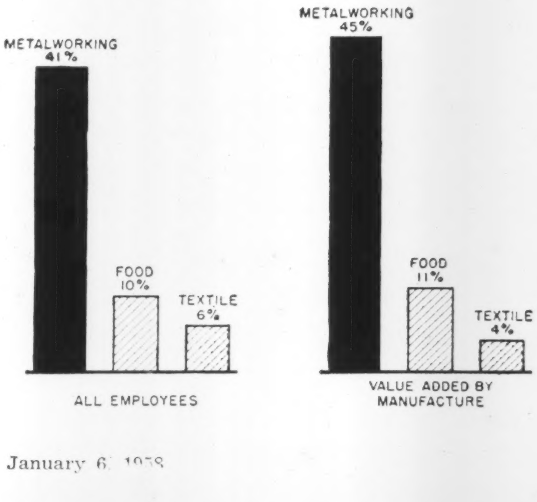
[*] Estimates for 1957 are by STEEL. Figures for other years (except instruments) are from Office of Business Economics. Instruments figures for 1950 through 1957 are estimated by STEEL.

Greatest Industry



*Estimated.

HOW METALWORKING TOWERS OVER OTHER MANUFACTURING INDUSTRIES



Standard Industrial Classifications	TOTAL NUMBER PLANTS	NUMBER OF EMPLOYEES	VALUE Added by Manufacture (000)
20. Food and Kindred Products	42,374	1,647,204	$13,400,318
21. Tobacco Manufactures	627	94,863	988,001
22. Textile Mill Products	8,070	1,037,440	4,750,461
23. Apparel and Related Products ..	31,371	1,189,923	5,146,294
24. Lumber and Wood Products	41,485	645,936	3,188,434
25. Furniture and Fixtures	10,273	340,694	1,966,410
26. Pulp, Paper, and Products	5,004	530,210	4,581,944
27. Printing and Publishing	32,531	804,386	6,261,558
28. Chemicals and Allied Products ..	11,075	739,389	9,441,629
29. Petroleum and Coal Products ..	1,381	215,843	2,582,613
30. Rubber Products	1,406	246,526	1,903,702
31. Leather and Leather Goods	4,845	356,578	1,637,417
32. Stone, Clay, and Glass Products	11,162	491,814	3,820,959
33. Primary Metal Industries	**5,838**	**1,117,059**	**9,372,910**
34. Fabricated Metal Products	**22,516**	**1,019,406**	**7,596,175**
35. Machinery (except Electrical) .	**25,601**	**1,541,725**	**12,339,016**
36. Electrical Machinery	**5,758**	**959,126**	**7,403,134**
37. Transportation Equipment	**5,348**	**1,704,572**	**13,925,908**
38. Instruments & Related Products	**3,142**	**272,586**	**2,128,706**
Total Metalworking Industry	**68,203**	**6,614,474**	**$52,765,849**
39. Miscellaneous Manufactures	17,010	695,917	4,473,050
Administrative and Auxiliary ..	4,187	474,256	....

1954 Census of Manufactures.

World Production

METALWORKING FACTS AND FIGURES

By Countries—Net Tons

STEEL INGOT AND CASTINGS OUTPUT

	1957a	1956	1955	1954	1953	1952	1951	1950
World Total	322,139,400	310,785,979	296,380,765	215,692,102	258,152,924	233,028,459	232,179,538	208,102,015
	↓	↓	↓	↓	↓	↓	↓	↓
United States	113,000,000	115,216,149	117,036,085	88,311,652	111,609,719	93,168,039	105,199,848	96,836,075
Canada	5,270,700	5,307,600	4,534,656	3,195,025	4,116,110	3,703,050	3,568,770	3,383,520
Great Britain	24,200,000	23,138,000	22,165,470	20,742,400	19,721,520	18,388,050	17,515,120	18,247,825
Japan	14,430,000	12,217,040	10,348,470	8,524,990	8,428,420	7,687,240	7,151,980	5,322,900
India	1,770,000	1,946,560	1,908,704	1,886,975	1,687,280	1,767,580	1,679,660	1,610,335
Australia	3,379,000	2,915,560	2,916,480	2,486,400	2,294,880	1,817,760	1,649,870	1,395,185
South Africa	1,826,700	1,748,300	1,632,960	1,517,710	1,367,855	1,325,630	1,045,070	832,385
Brazil	1,597,000	1,465,200	1,282,600	1,263,130	1,117,930	982,630	927,300	867,460
Mexico	700,000	631,680	560,780	499,840	508,310	559,350	498,410	210,460
Spain	1,450,000	1,367,300	1,334,300	1,210,000	983,730	998,030	900,020	899,800
Sweden	2,760,000	2,637,800	2,338,600	2,048,200	1,960,200	1,857,900	1,677,500	1,604,900
Austria	2,735,000	2,285,800	2,005,300	1,818,300	1,411,520	1,162,700	1,130,580	1,037,300
Yugoslavia	1,100,000	973,500	886,600	677,600	566,500	486,200	473,000	470,800
France (e)	15,500,000	14,738,350	13,851,200	11,689,700	10,996,700	11,953,700	10,818,500	9,517,200
Saar (e)	4,000,000	3,711,400	3,481,500	3,085,500	2,952,400	3,105,300	2,863,300	2,087,800
Belgium (e)	6,960,000	7,012,500	6,481,200	5,485,700	4,986,300	5,592,400	5,577,000	4,167,900
Luxembourg (e)	3,873,000	3,801,600	3,547,500	3,110,800	2,924,900	3,302,200	3,384,700	2,696,100
Italy (e)	7,500,000	6,498,800	5,934,500	4,627,700	3,850,000	3,888,500	3,307,590	2,555,300
The Netherlands (e)	1,200,000	1,146,420	1,070,520	1,020,360	945,450	753,500	608,300	539,000
Germany	....	....	....	....	....	....	....	14,427,600
Germany, West Zone (e)	27,000,000	25,507,900	23,469,600	19,177,400	16,962,000	17,386,600	14,856,600	....
Free World Total	240,251,400	234,267,459	226,787,025	182,379,382	199,391,724	179,886,359	184,833,118	168,739,845
Germany, Soviet Zone	3,234,000	3,014,000	2,758,800	2,454,100	2,394,700	2,082,300	1,707,200	....
Czechoslovakia	5,692,000	5,370,200	4,921,400	4,699,200	4,873,000	4,169,000	3,643,200	3,312,100
Poland	5,912,000	5,515,730	4,869,040	4,344,120	3,964,400	3,501,300	3,071,200	2,766,500
Hungary	1,815,000	1,567,610	1,791,900	1,640,100	1,697,300	1,535,600	1,357,400	1,124,200
Rumania	880,000	859,980	841,500	689,700	790,900	767,800	710,600	613,800
USSR	56,500,000	53,471,000	49,798,100	45,577,400	41,800,000	37,950,000	34,540,000	30,030,000
China	5,485,000	4,565,000	3,058,000	2,452,800	1,945,900	1,644,500	990,000	798,600
Iron Curtain Total	79,518,000	74,363,520	68,038,740	61,857,420	57,466,200	51,650,500	46,019,600	38,645,200
Other Countries (b)	2,370,000	2,155,000	1,555,000	1,455,300	1,295,000	1,491,600	1,326,820	717,000

(a) Estimated.
(b) Countries producing less than 500,000 tons annually.
(c) Rumania included in "Other Countries" prior to 1953.
(d) Yugoslavia included in "Other Countries" prior to 1955.
(e) Member of European Coal & Steel Community.

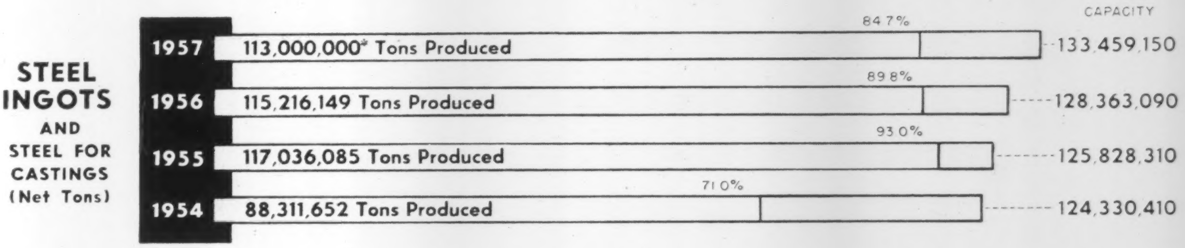
PIG IRON AND FERROALLOYS OUTPUT

(Includes ferroalloys made in electric furnaces, where available)

	1957a	1956	1955	1954	1953	1952	1951	1950
World Total	234,113,300	220,970,568	211,628,433	174,522,666	184,986,868	168,030,620	165,578,353	147,204,201
	↓	↓	↓	↓	↓	↓	↓	↓
United States	81,300,000	77,575,458	79,263,865	59,806,242	77,250,168	63,353,955	72,448,543	66,400,311
Canada	4,100,000	3,801,600	3,405,248	2,309,776	3,165,905	2,913,680	2,812,540	2,497,600
Great Britain	15,920,000	14,750,500	13,966,400	13,309,408	12,515,775	12,015,025	10,829,050	10,788,850
Japan	7,790,000	6,889,960	5,785,280	5,069,130	4,969,910	3,821,620	3,550,000	2,528,680
India	2,106,700	2,173,920	2,122,176	2,197,440	1,989,455	2,075,360	2,016,110	1,880,370
Australia	2,460,600	2,316,160	2,016,000	2,083,200	1,894,705	1,718,080	1,470,900	1,229,870
South Africa	1,560,000	1,501,700	1,433,824	1,319,360	1,347,360	1,244,320	866,880	807,850
Brazil	1,290,000	1,258,400	1,181,400	1,197,790	974,600	892,650	848,760	801,900
Spain	1,100,000	1,052,700	1,094,500	998,580	910,470	870,540	719,400	733,700
Sweden	1,550,000	1,500,000	1,371,370	1,101,320	1,163,140	1,213,300	936,100	931,150
Austria	2,125,000	1,912,900	1,658,470	1,489,290	1,456,180	1,291,840	1,153,900	971,410
Yugoslavia (d)	725,000	694,100	565,400	....	....	....	....	....
France (e)	13,100,000	12,801,800	12,196,800	9,835,100	9,634,900	10,745,900	9,625,000	8,537,100
Saar (e)	3,495,000	3,334,100	3,166,900	2,746,700	2,620,200	2,805,000	2,605,900	1,850,200
Belgium (e)	6,200,000	6,337,100	5,929,000	5,087,500	4,639,800	5,269,000	5,335,000	4,064,500
Luxembourg (e)	3,711,000	3,647,600	3,393,500	3,081,100	2,990,900	3,383,600	3,472,700	2,748,900
Italy (e)	2,545,000	2,194,500	1,907,400	1,480,600	1,475,100	1,325,500	1,110,450	482,790
The Netherlands (e)	780,000	727,980	737,440	671,550	650,100	592,570	576,400	499,620
Germany	....	....	....	....	....	....	....	10,791,000
Germany, West Zone (e)	20,400,000	19,461,200	18,230,300	13,839,100	12,883,200	14,253,800	11,766,700	....
Free World Total	172,258,300	163,931,678	159,425,273	127,623,186	142,531,868	129,785,740	132,144,333	118,545,801
Germany, Soviet Zone	2,090,000	1,731,400	1,668,700	1,450,000	1,174,800	716,100	375,100	....
Czechoslovakia	3,960,000	3,637,700	3,280,200	3,062,400	3,069,000	2,563,000	2,370,500	2,257,200
Poland	4,100,000	3,909,400	3,423,310	2,929,080	2,528,900	1,960,200	1,734,700	1,636,800
Hungary	990,000	817,960	940,500	902,000	787,600	632,500	556,600	550,000
Rumania (c)	660,000	646,030	626,450	475,200	501,600	....	....	....
USSR	41,925,000	39,329,400	36,641,000	32,970,000	30,250,000	27,720,000	24,310,000	21,340,000
China	6,000,000	5,137,000	4,048,000	3,385,800	2,443,100	2,583,900	2,200,000	1,374,400
Iron Curtain Total	59,725,000	55,208,890	5 628,160	45,174,480	40,755,000	36,175,700	31,546,900	27,158,400
Other Countries (b)	2,130,000	1,830,000	1,575,000	1,725,000	1,700,000	2,069,180	1,887,120	1,500,000

Production-Capacity

METALWORKING FACTS AND FIGURES



STEEL INGOTS AND STEEL FOR CASTINGS (Net Tons)

ANNUAL STEEL CAPACITY & PRODUCTION BY PROCESSES

	Open Hearth		Bessemer		Crucible		Electric		LD Process	TOTALS		Per Cent
	Capacity	Production	Capacity	Production	Capacity	Production	Capacity	Production	Capacity‡	Capacity†	Production	Capacity
1957......	116,912,410	....	4,505,000	....	40	....	11,501,700	....	540,000	133,459,150	113,000,000*	84.7*
1956......	112,317,040	102,840,585	4,787,000	3,227,997	40	‡	10,719,010	9,147,567	540,000	128,363,090	115,216,149	89.8
1955......	110,234,160	105,359,417	4,787,000	3,319,517	40	‡	10,807,110	8,357,151	......	125,828,310	117,036,085	93.0
1954......	109,094,730	80,327,494	4,787,000	2,548,104	40	‡	10,448,610	5,436,054	......	124,330,410	88,311,652	71.0
1953......	102,677,980	100,473,823	4,637,000	3,855,705	40	‡	10,232,450	7,280,191	......	117,547,470	111,609,719	94.9
1952......	94,973,780	82,846,439	5,381,000	3,523,677	40	‡	8,232,850	6,797,923	......	108,587,670	93,168,039	85.8
1951......	91,054,020	93,166,518	5,621,000	4,890,946	20	‡	7,554,610	7,142,384	......	104,229,650	105,199,848	100.9
1950......	86,984,490	86,262,509	5,537,000	4,534,558	20	‡	6,871,290	6,039,008	......	99,392,800	96,836,075	96.9 =
1949......	84,817,040	70,248,803	5,191,000	3,946,656	20	‡	6,112,870	3,782,717	......	96,120,930	77,978,176	81.1
1948......	83,610,690	79,340,157	5,226,000	4,243,172	20	‡	5,396,750	5,057,141	......	94,233,460	88,640,470	94.1
1947......	81,010,990	76,873,793	5,154,000	4,232,543	20	‡	5,076,240	3,787,735	......	91,241,250	84,894,071	93.0
1946......	81,236,250	60,711,963	5,154,000	3,327,737	20	‡	5,500,290	2,563,024	......	91,890,560	66,602,724	72.5
1945......	84,171,590	71,939,602	5,874,000	4,305,318	3,800	24	5,455,890	3,456,704	......	95,505,280	79,701,648	83.5
1944......	82,223,610	80,363,953	6,074,000	5,039,923	3,800	25	5,350,880	4,237,699	......	93,652,290	89,641,600	95.5 =
1943......	79,180,880	78,621,804	6,553,000	5,625,492	3,800	146	4,554,980	4,589,070	......	90,292,660	88,836,512	98.1 =
1942......	78,107,260	76,501,957	6,721,400	5,553,424	3,800	2,010	3,737,510	3,974,540	......	88,569,970	86,031,931	96.8 =
1941......	74,565,510	74,389,619	6,996,520	5,578,071	3,942	2,313	2,586,320	2,869,256	......	84,152,292	82,839,259	97.3 =
1940......	73,721,592	61,573,083	6,009,920	3,708,573	5,354	1,024	1,882,630	1,700,006	......	81,619,496	66,982,686	82.1
1939......	72,959,638	48,409,800	7,138,880	3,358,916	5,354	931	1,725,086	1,029,067	......	81,828,958	52,798,714	64.5
1938......	71,472,370	29,080,016	7,212,800	2,106,340	9,610	7	1,490,858	565,627	......	80,185,638	31,751,990	39.6
1937......	69,725,736	51,824,979	7,084,000	3,863,918	11,850	1,046	1,326,788	947,002	......	78,148,374	56,636,945	72.5

*Estimated by STEEL. †As of Jan. 1. ‡Production included with electric steel. = Based on average annual capacity.
American Iron & Steel Institute.

MONTHLY OUTPUT OF STEEL INGOTS & CASTINGS

	Open Hearth		Bessemer		Electric		Totals		Calculated
	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons	% Capac.	Net Tons Weekly
1957 ...	....	....	......	....	......	....	113,000,000*	84.7*	....
10 Mo. .	87,200,294	....	2,232,515	....	7,466,266	....	96,899,075	....	....
Jan. ...	9,829,691	99.0	294,839	77.1	884,232	86.5	11,008,762	97.1	2,485,048
Feb. ...	8,898,671	99.2	277,682	80.4	810,853	87.8	9,987,206	97.6	2,496,801
Mar. ...	9,442,164	95.1	275,156	71.9	871,754	85.2	10,589,074	93.4	2,390,310
Apr. ...	8,820,328	91.8	231,731	62.6	762,721	77.1	9,814,780	89.5	2,287,828
May ...	8,842,707	89.1	201,864	52.8	747,752	73.1	9,792,323	86.4	2,210,457
June ...	8,498,903	88.4	210,915	57.0	681,584	68.9	9,391,402	85.6	2,189,138
July ...	8,086,519	81.4	194,638	50.9	627,575	61.4	8,908,732	78.6	2,015,550
Aug. ...	8,297,172	83.6	204,723	53.5	731,995	71.6	9,233,890	81.5	2,084,400
Sept. ...	8,135,139	84.7	185,967	50.2	656,800	66.4	8,977,906	81.8	2,097,642
Oct. ...	8,349,000	84.1	155,000	40.5	691,000	67.6	9,195,000	81.1	2,076,000
Nov. ...	....	....	......	....	......	....	....	....	....
Dec. ...	....	....	......	....	......	....	....	....	....
1956	102,840,585	91.6	3,227,997	67.4	9,147,567	81.2	115,216,149	89.8	2,203,828
Jan. ...	9,676,151	101.4	323,235	79.5	828,845	86.7	10,828,231	99.3	2,444,296
Feb. ...	9,043,064	101.3	296,543	78.0	779,388	87.1	10,118,995	99.2	2,444,202
Mar. ...	9,795,263	102.7	310,060	76.3	819,465	85.7	10,924,788	100.2	2,466,092
Apr. ...	9,437,945	102.2	306,388	77.9	779,452	84.2	10,523,785	99.7	2,453,097
May ...	9,370,167	98.2	297,990	73.3	822,219	86.0	10,490,376	96.2	2,368,031
June ...	8,664,605	93.9	282,846	71.9	773,546	83.6	9,720,997	92.1	2,265,967
July ...	1,330,151	13.9	......	....	292,012	30.5	1,622,163	14.9	367,005
Aug. ...	7,213,274	75.6	189,564	46.6	719,759	75.3	8,122,597	74.5	1,833,543
Sept. ...	9,342,796	101.2	286,978	72.9	792,885	85.7	10,422,659	98.8	2,435,201
Oct. ...	9,841,002	103.2	330,101	81.2	877,410	91.8	11,048,513	101.3	2,494,021
Nov. ...	9,430,248	102.2	295,827	75.2	829,425	89.6	10,555,500	100.0	2,460,490
Dec. ...	9,695,919	101.6	308,465	75.9	833,161	87.1	10,837,545	99.4	2,451,933

American Iron & Steel Institute. *Estimated.

PIG IRON †

CAPACITY & PRODUCTION

Net Tons

	Capacity	Production	%
1957	86,817,950	81,300,000*	93.6*
January		7,282,373	98.8
February		6,658,106	100.0
March		7,246,879	98.3
April		6,870,886	96.3
May		6,945,447	94.2
June		6,659,592	93.3
July		6,691,932	90.8
August		6,781,751	92.0
September		6,627,911	92.9
October		6,519,478	88.4
November		....	....
December		....	....
1956	85,485,230	75,959,560	88.9
1955	83,971,100	77,789,684	92.6
1954	82,001,390	58,686,884	71.6
1953	79,380,240	75,856,872	95.6
1952	73,782,340	62,150,926	84.2
1951	72,471,780	71,227,750	98.3
1950	71,560,110	65,439,769	91.4
1949	70,541,850	54,175,534	76.8
1948	67,438,930	61,043,806	90.5
1947	65,709,200	59,314,348	90.3
1946	67,340,590	45,547,907	67.6
1945	67,313,890	54,166,482	80.5
1944	67,921,410	62,072,683	91.4
1943	64,188,220	61,920,314	96.5
1942	60,606,850	60,115,387	99.2

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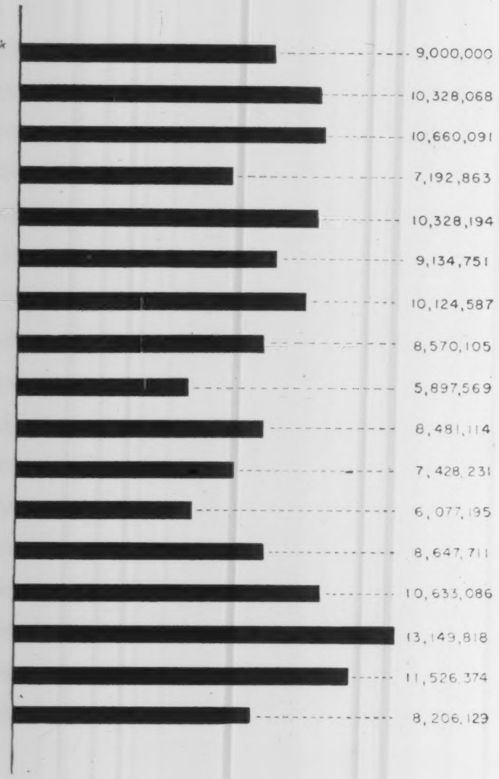
†Including ferroalloys made in blast furnaces. *Estimated by STEEL.
American Iron & Steel Institute.

ALLOY STEEL PRODUCTION

Total Ingots and Castings—Net Tons



ALLOY STEEL PRODUCTION BY PROCESSES

(Including stainless steel)
Ingots and Castings—Net Tons

	Open Hearth Basic	Open Hearth Acid	Open Hearth Total	Bessemer	Crucible	Electric
1957‡	....	....	5,052,097	....	†	2,605,094
1956	6,288,648	201,377	6,490,025	....	†	3,838,043
1955	6,735,450	185,473	6,920,923	....	†	3,739,168
1954	4,528,336	130,559	4,658,895	....	†	2,533,968
1953	6,599,038	185,341	6,784,379	....	†	3,543,815
1952	5,807,191	218,867	6,026,058	....	†	3,108,693
1951	6,585,635	238,034	6,823,669	....	†	3,300,918
1950	5,738,067	123,253	5,861,320	....	†	2,708,785
1949	4,192,344	105,550	4,297,894	....	†	1,599,675
1948	6,285,054	128,915	6,413,969	....	†	2,067,145
1947	5,520,540	128,754	5,649,294	....	†	1,778,937
1946	4,325,657	115,711	4,441,368	....	†	1,635,827
1945	5,572,353	274,889	5,847,242	....	18	2,800,451
1944	6,494,627	515,662	7,010,289	....	23	3,622,774
1943	8,539,523	677,416	9,216,939	....	136	3,932,743
1942	7,524,209	608,867	8,133,076	....	522	3,392,776
1941	5,306,415	433,240	5,739,655	3,890	933	2,461,651

*Estimated.
‡First ten months.
†Included with electric steel.
American Iron & Steel Institute.

Stainless & Heat Resisting Steel Production

Net Tons of Ingots

Type Number	9 Mo. 1957	12 Mo. 1956	Type Number	9 Mo. 1957	12 Mo. 1956
201	7,510	11,051	318	1,820	711
202	11,847	8,403	403	16,094	30,526
301	38,715	55,337	405	2,241	6,622
302	134,998	209,639	406	2,852	3,192
302B	490	3,085	410	37,678	70,319
303	24,697	34,211	414	437	592
303Se	809	918	416	18,861	30,443
304	116,215	188,707	416Se	157	.....
304L	17,636	10,854	420	3,162	5,871
305	2,007	5,063	430	168,056	261,256
308	4,337	6,199	430F	1,833	2,806
309	5,972	9,229	431	4,290	5,199
309S	1,731	872	440A	1,120	2,318
310	6,998	12,597	440B	1,142	1,586
310S	2,096	765	440C	1,928	2,917
314	411	280	442	478	555
316	29,459	77,290	443	101	581
316L	11,599	3,808	446	1,556	2,877
317	828	930	All other	62,278	115,091
321	29,782	50,288			
347	9,415	15,101	Totals	793,733	1,218,289

American Iron & Steel Institute.

High Speed and Tool Steel Bars

(Excluding Hollow Drill Steel)
Shipments—Net Tons

CLASS A HIGH SPEED STEEL

Grade	C (Min.)	Cr (Maximum)	W (Maximum)	Mo (Maximum)	V	Co (Min.)	10 Mo 1957	12 Mo 1956
I	0.60	4.5	6.75	5.5	2.1 Max.	...	6,497	10,292
I-b	0.90	4.5	6.75	6.5	2.25 Min.	...	883	1,053
I-c	0.60	4.5	6.75	5.5	2.2 Max.	3.5	111	196
II	0.60	4.5	2.0	9.25	1.3 Max.	...	1,113	5,612
II-c	0.60	4.5	2.0	9.25	2.2 Max.	3.5	176	222
III	0.60	4.5	...	9.25	2.2 Max.	...	2,585	3,218
III-c	0.60	4.5	...	9.25	2.2 Max.	3.5	50	25
Totals							11,418	20,618

CLASS B HIGH SPEED STEEL

Grade	C (Min.)	Cr (Maximum)	W (Maximum)	Mo (Maximum)	V	Co (Min.)	10 Mo 1957	12 Mo 1956
IV	0.55	4.5	19.0	...	1.3 Max.	...	1,628	2,526
IV-b	0.55	4.5	19.0	1.25	1.75 Min.	...	121	266
IV-c	0.55	4.5	22.0	1.25	2.2 Max.	3.5	631	828
Totals							2,380	3,614

OTHER TOOL STEELS

Grade		10 Mo 1957	12 Mo 1956
V	All hot-work steel	10,567	14,455
VI	High chromium (4% Cr minimum) die steels	8,491	12,161
VII	All other alloy tool steels	39,702	59,859
VIII	Carbon tool steels, excluding hollow drill steel	10,792	17,120
Totals		69,552	103,595
Grand Totals		83,350	128,157

American Iron & Steel Institute.

Steel Forgings

Shipments for Sale—Net Tons

	Drop and Upset	Press and Open Hammer	Total
1957			
Jan.	112,995	34,704	147,699
Feb.	102,172	32,842	135,014
Mar.	107,899	37,884	145,783
Apr.	103,367	35,643	139,010
May	100,803	34,509	135,312
June	92,942	35,535	128,477
July	79,099	24,978	104,077
Aug.	88,395	27,032	115,427
Sept.	86,327	30,582	116,909
Oct.	....	....	....
Nov.	....	....	....
Dec.	....	....	....
1956	1,256,125	414,182	1,670,307
Jan.	124,652	35,452	160,104
Feb.	118,138	33,584	151,722
Mar.	122,180	36,760	158,940
Apr.	114,782	35,224	150,006
May	111,970	38,598	150,568
June	103,371	40,071	143,442
July	76,240	22,221	98,461
Aug.	89,131	34,037	123,168
Sept.	88,203	33,267	121,470
Oct.	110,845	37,470	148,315
Nov.	100,315	31,208	131,523
Dec.	96,298	33,290	129,588
1955	1,316,540	434,093	1,750,633
1954	1,049,803	351,688	1,401,491
1953	1,477,290	563,656	2,040,946
1952	1,366,123	519,539	1,885,662

U. S. Bureau of the Census.

Distribution

METALWORKING FACTS AND FIGURES

FINISHED STEEL DISTRIBUTION

By Market Classifications

(All Grades, Net Tons)	12 Mo. 1957*	12 Mo. 1956	12 Mo. 1955	12 Mo. 1954
Warehouses & Distributors	15,220,585	16,752,233	15,758,003	11,999,470
Automotive	13,504,100	14,141,887	18,721,880	11,792,989
Construction, including Maintenance	12,527,900	10,441,126	9,681,778	8,634,987
Containers	6,735,780	6,818,361	6,723,074	5,870,618
Export	4,685,760	3,622,427	3,583,077	2,533,883
Machinery, Indus. Equip. & Tools	4,685,760	5,031,599	4,699,026	3,517,038
Rail Transportation	4,457,980	4,226,654	3,520,849	2,457,297
Converters & Processors	3,644,480	3,776,559	3,753,381	2,452,703
Contractors' Products	3,489,915	4,074,577	3,982,161	2,969,812
Electrical Machinery & Equip.	2,115,100	2,437,804	2,291,866	1,739,007
Other Domestic & Commercial Equip.	1,854,780	2,263,775	2,189,416	1,742,090
Appliances	1,488,705	2,129,115	2,199,114	1,441,461
Shipbuilding, Marine Equipment	1,212,115	760,306	601,234	501,231
Bolts, Nuts, Rivets, Screws	1,122,630	1,485,087	1,475,340	962,572
Forgings (other than Automotive)	1,106,360	1,473,186	1,266,032	832,876
Agricultural	1,049,415	1,082,459	1,336,886	1,189,199
Unclassified	846,040	947,180	919,154	675,019
Oil & Gas Drilling	756,555	778,714	792,767	585,562
Ordnance, Other Military	390,480	523,890	856,527	964,440
Mining, Quarrying, Lumbering	341,670	349,508	268,987	201,624
Aircraft	113,890	134,721	96,892	88,848
Totals	81,350,000	83,251,168	84,717,444	63,152,726

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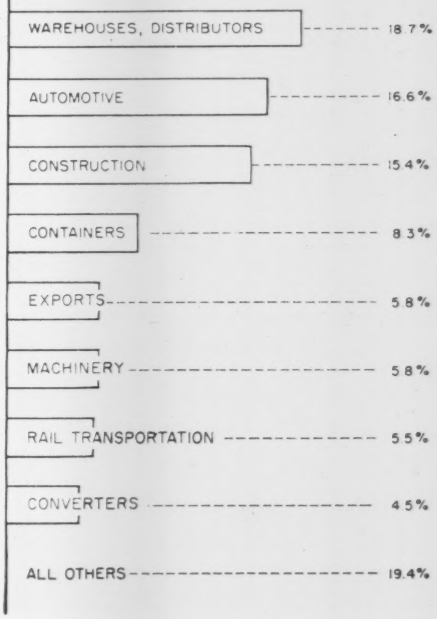
*Estimated by STEEL on basis of shipments in first nine months.

American Iron & Steel Institute.

WHERE THE STEEL GOES

1957 — ESTIMATED

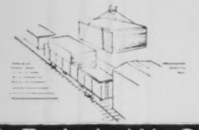


DISTRIBUTION

NET TONS

By Market Classifications	STAINLESS STEEL and Heat Resisting 9 Mo. 1957	12 Mo. 1956	12 Mo. 1955	ALLOY STEEL (Other than Stainless) 9 Mo. 1957	12 Mo. 1956	12 Mo. 1955	CARBON STEEL 9 Mo. 1957	12 Mo. 1956	12 Mo. 1955
Converters & Processors	38,743	56,160	61,364	61,190	93,732	86,603	2,699,533	3,626,667	3,605,414
Forgings (other than Automotive)	12,045	27,136	13,986	315,545	531,862	517,513	520,865	911,188	734,533
Bolts, Nuts, Rivets, Screws	6,518	8,809	9,349	58,891	85,587	82,113	799,474	1,390,691	1,383,878
Warehouses & Distributors	169,461	227,465	188,311	410,413	605,908	574,614	11,128,348	15,923,436	14,995,080
Construction, including Maintenance	5,587	5,439	4,219	99,638	110,162	79,085	9,532,301	10,325,525	9,598,444
Contractors' Products	11,408	16,632	17,317	14,378	19,106	24,729	2,662,155	4,038,839	3,940,115
Automotive	76,757	101,487	143,016	1,071,523	1,619,252	2,122,267	9,244,716	12,421,148	16,456,597
Rail Transportation	1,785	3,710	5,244	185,525	212,316	156,945	3,240,735	4,010,628	3,358,660
Shipbuilding, Marine Equip.	1,790	2,290	2,259	69,951	71,517	44,762	859,927	686,499	554,213
Aircraft	22,520	33,990	22,379	39,163	73,095	46,300	23,551	27,636	28,213
Oil & Gas Drilling	705	1,368	405	132,090	230,169	208,938	448,472	544,215	583,424
Mining, Quarrying, Lumbering	414	461	415	23,157	31,908	29,108	242,292	317,136	239,464
Agricultural	490	1,213	464	21,229	29,674	39,231	787,647	1,051,572	1,297,191
Machinery, Indus. Equip. & Tools	41,142	56,936	41,103	429,080	676,384	597,606	3,133,397	4,298,279	4,060,315
Electrical Machinery & Equip.	10,723	19,728	8,953	369,488	598,236	562,861	1,246,861	1,819,840	1,720,052
Appliances, Utensils, Cutlery	26,025	44,413	48,162	7,707	21,158	21,487	1,112,513	2,063,544	2,129,465
Other Domestic & Commercial Equip.	11,114	15,315	15,259	14,952	29,567	21,793	1,398,349	2,218,893	2,152,364
Containers	1,271	2,904	3,874	23,873	35,722	29,335	5,157,988	6,779,735	6,689,865
Ordnance, Other Military	1,782	3,867	3,035	57,525	84,386	92,191	240,895	435,637	761,301
Export	21,382	22,054	24,761	155,144	209,596	125,064	3,431,495	3,389,163	3,433,252
Unclassified	28,533	36,319	72,544	120,390	186,076	166,973	503,767	724,785	679,637
Totals	490,195	687,699	686,449	3,683,852	5,558,413	5,629,518	58,415,281	77,005,056	78,401,477

American Iron & Steel Institute.

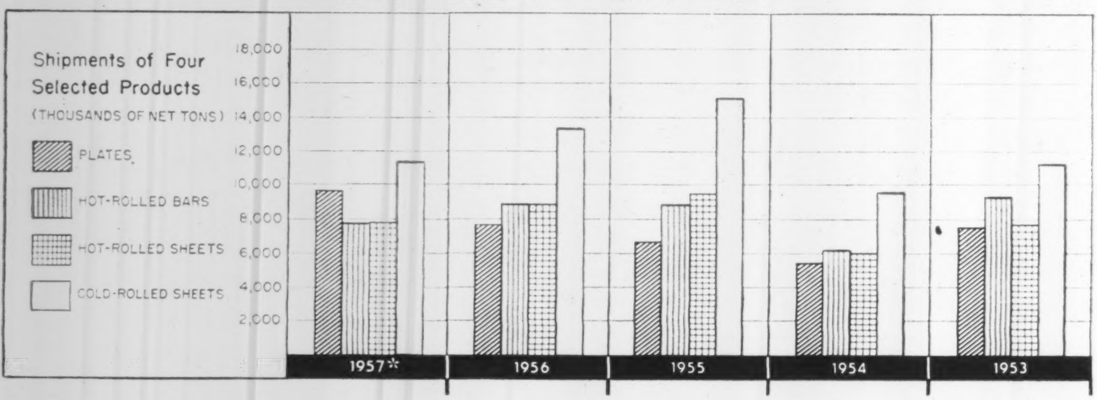


Steel Shipments

METALWORKING FACTS AND FIGURES

SHIPMENTS OF STEEL PRODUCTS

(All grades, including carbon, alloy, and stainless)



Steel Products—Net tons	1957* Shipments	%	1956 Shipments	%	1955 Shipments	%	1954 Shipments	%	1953 Shipments	%
Ingots and steel castings	488,100	0.60	702,744	0.9	678,630	0.8	316,664	0.5	918,589	1.1
Blooms, slabs, billets, tube rounds, sheet bars, etc.	....	...	....	..	2,744,477	3.2	1,530,025	2.4	2,625,152	3.3
Blooms, slabs, billets, sheet bars	2,521,850	3.10	2,275,640	2.7	....	..	....	..	....	..
Tube rounds	65,080	0.08	12,530	..	....	..	....	..	....	..
Skelp	154,565	0.19	197,825	0.2	191,591	0.2	129,679	0.2	113,397	0.1
Wire rods	959,930	1.18	1,132,434	1.4	1,203,842	1.4	760,885	1.2	800,648	1.0
Structural shapes (heavy)	6,719,510	8.26	5,348,981	6.4	4,736,987	5.6	4,501,183	7.1	5,022,012	6.3
Steel piling	577,585	0.71	434,103	0.5	391,348	0.5	387,654	0.6	342,894	0.4
Plates	9,599,300	11.80	7,714,623	9.3	6,762,258	8.0	5,340,262	8.5	7,668,274	9.6
Rails—Standard (over 60 lb)	1,317,870	1.62	1,201,354	1.4	1,150,977	1.3	1,113,366	1.8	1,866,546	2.3
Rails—All other	89,485	0.11	98,362	0.1	82,767	0.1	83,577	0.1	87,510	0.1
Joint bars	89,485	0.11	81,557	0.1	68,314	0.1	64,304	0.1	121,102	0.2
Tie plates	284,725	0.35	298,201	0.4	311,411	0.4	236,011	0.4	425,945	0.5
Track spikes	81,350	0.10	93,467	0.1	93,097	0.1	65,608	0.1	120,409	0.2
Wheels (rolled or forged)	374,210	0.46	348,396	0.4	306,406	0.4	192,483	0.3	332,245	0.4
Axles	211,510	0.26	171,780	0.2	119,246	0.1	60,956	0.1	154,210	0.2
Bars—Hot-rolled (including light shapes)	7,744,520	9.52	8,840,349	10.6	8,798,261	10.4	6,255,465	9.9	9,323,429	11.6
Bars—Reinforcing	2,448,635	3.01	2,518,691	3.0	2,164,641	2.6	1,750,957	2.8	1,848,851	2.3
Bars—Cold-finished	1,342,275	1.65	1,736,369	2.1	1,877,961	2.2	1,210,273	1.9	2,194,375	2.7
Tool steel	97,620	0.12	125,866	0.2	114,529	0.1	84,143	0.1	116,152	0.1
Standard pipe	2,765,900	3.40	2,927,308	3.5	2,968,241	3.5	2,320,265	3.7	2,801,820	3.5
Oil country goods	2,953,005	3.63	2,560,223	3.1	2,542,109	3.0	2,291,176	3.6	2,019,345	2.5
Line pipe	4,238,335	5.21	3,376,063	4.1	3,083,736	3.7	2,594,873	4.1	3,507,318	4.4
Mechanical tubing	805,365	0.99	949,846	1.1	965,829	1.1	674,214	1.1	1,089,480	1.4
Pressure tubing	423,020	0.52	384,988	0.5	276,068	0.3	277,208	0.4	440,675	0.6
Wire—Drawn	2,635,740	3.24	2,988,377	3.5	3,192,678	3.8	2,420,982	3.8	2,826,744	3.5
Wire—Nails and staples	471,830	0.58	557,283	0.7	650,956	0.7	567,382	0.9	528,935	0.7
Wire—Barbed and twisted	65,080	0.08	74,318	0.1	113,372	0.1	132,346	0.2	163,801	0.2
Wire—Woven wire fence	227,780	0.28	273,352	0.3	312,158	0.4	299,917	0.5	245,264	0.3
Wire—Bale ties	56,945	0.07	49,672	0.1	60,389	0.1	51,749	0.1	37,945	..
Black plate	626,395	0.77	765,055	0.9	797,720	1.0	672,803	1.1	748,889	0.9
Tin and terne plate—Hot dipped	748,420	0.92	950,070	1.1	1,100,762	1.3	1,307,096	2.1	1,318,080	1.6
Tin plate—Electrolytic	5,084,375	6.25	4,615,068	5.6	4,503,637	5.3	3,680,467	5.8	3,343,458	4.2
Sheets—Hot rolled	7,858,410	9.66	8,790,540	10.6	9,430,711	11.1	6,094,268	9.7	7,742,609	9.7
Sheets—Cold rolled	11,437,810	14.06	13,317,002	16.0	15,167,629	17.9	9,605,689	15.2	11,274,369	14.1
Sheets—Galvanized	2,375,420	2.92	2,957,991	3.5	2,864,497	3.4	2,362,632	3.7	2,290,868	2.9
Sheets—All other coated	195,240	0.24	226,556	0.3	275,046	0.3	178,961	0.3	253,946	0.3
Sheets—Enameling	....	...	....	..	....	..	180,218	0.3	228,938	0.3
Electrical sheets and strip	642,665	0.79	813,381	1.0	791,043	0.9	588,851	0.9	820,096	1.0
Strip—Hot rolled	1,391,085	1.71	1,796,157	2.2	2,089,491	2.5	1,486,141	2.4	2,221,462	2.8
Strip—Cold rolled	1,179,575	1.45	1,544,646	1.8	1,734,629	2.1	1,281,993	2.0	2,166,111	2.7
Total steel products	81,350,000	100.00	83,251,168	100.0	84,717,444	100.0	63,152,726	100.0	80,151,893	100.0

1957 SHIPMENTS OF FINISHED STEEL BY TYPES

(Net tons)

	Carbon	Alloy	Stainless	Total
Jan.	7,262,356	481,753	65,342	7,809,451
Feb.	6,582,506	425,051	59,175	7,066,732
Mar.	7,307,091	452,870	61,655	7,821,616
Apr.	6,864,901	426,594	58,257	7,349,752
May	6,482,289	436,561	53,241	6,972,091
June	6,810,186	415,148	59,282	7,284,616
July	5,504,348	328,972	43,813	5,877,133
Aug.	5,832,324	352,974	44,555	6,229,853
Sept.	5,764,811	363,136	43,727	6,171,674
9 Mo.	58,410,812	3,683,059	489,047	62,582,918

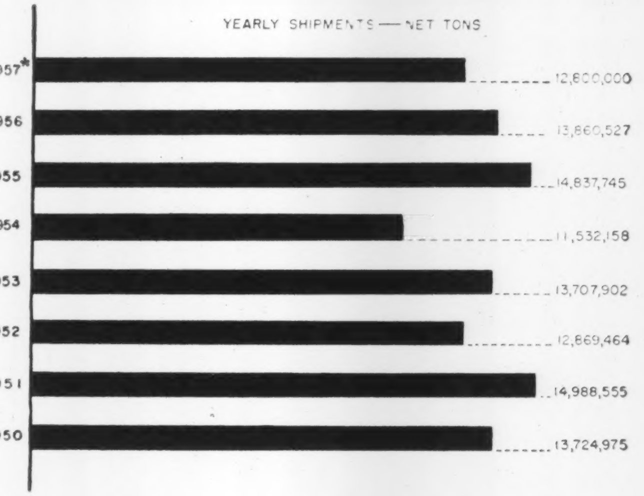
American Iron & Steel Institute.

*Estimated.

Castings

METALWORKING FACTS AND FIGURES

GRAY IRON CASTINGS



Shipments—Net Tons

	Miscel-laneous	Ingot Molds	Chilled Iron Railroad Car Wheels	Cast Iron Pressure Pipe & Fittings	Cast Iron Soil Pipe & Fittings	For Sale	For Own Use
1957							
9 Mo.	5,960,888	1,884,043	285,551	1,064,558	565,546	5,348,986	4,411,600
Jan.	761,697	261,964	31,139	101,069	57,346	642,317	570,898
Feb.	705,585	230,126	30,079	89,146	48,182	582,010	521,108
Mar.	713,767	214,775	36,995	108,158	59,451	604,481	528,665
Apr.	699,395	192,199	36,979	128,710	63,066	611,443	508,906
May	674,460	192,336	34,406	141,685	69,209	625,496	486,600
June	630,513	193,640	32,087	131,360	70,864	599,494	458,970
July	565,897	190,434	31,209	106,532	60,030	523,489	430,613
Aug.	630,130	205,655	28,976	138,209	72,987	596,779	479,178
Sept.	579,444	202,914	23,681	119,689	64,411	563,477	426,662
Oct.	....	....	....	....	....	....	....
Nov.	....	....	....	....	....	....	....
Dec.	....	....	....	....	....	....	....
1956	8,265,526	2,624,146	406,191	1,746,902	817,762	7,960,391	5,900,136
Jan.	769,826	257,150	32,408	131,346	58,788	675,941	573,577
Feb.	739,786	242,207	35,074	133,254	64,448	678,826	535,943
Mar.	752,498	254,045	42,676	132,384	73,802	715,173	540,232
Apr.	719,109	237,486	39,325	151,670	70,410	702,145	515,855
May	702,834	243,719	38,419	171,859	78,800	737,081	498,550
June	656,778	217,135	34,028	170,122	74,093	686,896	465,260
July	509,702	9,556	32,484	144,964	65,905	487,736	274,875
Aug.	639,953	170,857	31,712	180,249	80,424	671,523	431,672
Sept.	623,743	233,823	35,361	151,081	65,935	648,784	461,159
Oct.	749,200	252,203	30,978	171,377	70,976	734,384	540,350
Nov.	720,263	251,262	27,852	116,157	60,038	634,856	540,716
Dec.	681,834	254,703	25,874	92,439	54,143	587,046	521,947
1955	9,156,253	2,739,874	385,041	1,687,062	869,515	7,966,735	6,871,010
Jan.	706,665	192,132	25,783	106,070	61,273	562,209	529,714
Feb.	720,304	196,118	27,401	95,285	67,057	576,815	529,350
Mar.	847,874	217,571	36,732	129,746	82,995	687,402	627,516
Apr.	819,872	216,116	35,415	145,871	76,404	678,426	615,252
May	803,897	227,236	35,966	168,772	74,553	705,777	604,647
June	793,067	228,044	43,807	147,351	83,927	714,573	581,623
July	634,896	210,130	28,181	129,191	67,340	577,619	492,092
Aug.	718,423	238,007	29,298	156,074	84,510	686,215	540,097
Sept.	731,073	244,199	29,953	165,332	82,179	710,147	542,589
Oct.	795,875	245,759	31,877	160,875	75,923	711,102	599,207
Nov.	797,854	262,506	29,795	148,560	66,918	694,201	611,432
Dec.	786,480	262,056	30,833	133,935	46,436	662,249	597,491
1954	7,291,912	1,784,625	336,239	1,375,671	743,711	6,322,989	5,209,169
1953	8,449,837	2,828,159	467,142	1,285,598	677,166	7,494,843	6,213,059
1952	8,122,274	2,238,309	544,896	1,312,518	651,467	7,371,700	5,497,764
1951	9,573,347	2,614,517	639,996	1,473,192	687,503	8,453,048	6,535,507
1950	8,745,298	2,423,376	546,301	1,215,367	794,633	7,323,739	6,401,236

*Estimated.
U. S. Bureau of the Census.

DIECASTINGS

Shipments Thousands of Pounds

Copper and Copper-Base

	1957	1956	1955
Jan.	1,008	797	589
Feb.	874	799	639
Mar.	878	780	710
Apr.	894	719	651
May	953	751	762
June	868	753	737
July	825	503	688
Aug.	799	902	812
Sept.	870	927	689
Oct.	...	1,118	724
Nov.	...	1,055	710
Dec.	...	968	711
Totals	...	10,075	8,512

YEARLY TOTALS

1954	6,509	1951	12,516
1953	10,077	1950	15,099
1952	8,259	1949	9,199

Aluminum and Aluminum-Base

	1957	1956	1955
Jan.	37,194	33,262	26,758
Feb.	34,311	32,959	28,241
Mar.	37,521	33,974	33,355
Apr.	33,193	31,792	30,285
May	31,602	29,823	31,323
June	29,700	25,037	27,929
July	25,339	23,501	21,490
Aug.	26,319	29,563	26,726
Sept.	29,400	31,649	28,786
Oct.	....	37,792	31,829
Nov.	....	33,938	33,997
Dec.	.....	32,940	34,484
Totals	....	376,230	355,203

YEARLY TOTALS

1954	245,291	1951	151,465
1953	239,330	1950	167,201
1952	169,732	1949	98,340

Zinc and Zinc-Base

	1957	1956	1955
Jan.	67,456	67,817	57,519
Feb.	59,324	66,319	57,525
Mar.	60,877	65,553	70,858
Apr.	54,533	58,103	70,692
May	53,085	52,210	62,684
June	48,920	47,805	65,663
July	48,005	42,234	46,822
Aug.	49,360	52,284	61,702
Sept.	47,331	46,316	61,114
Oct.	.....	65,921	70,815
Nov.	.....	64,904	74,187
Dec.	.....	57,955	69,899
Totals	.....	687,421	769,480

YEARLY TOTALS

1954	513,902	1951	474,937
1953	515,033	1950	574,196
1952	405,538	1949	397,001

Lead and Lead-Base

	1957	1956	1955
Jan.	1,883	1,598	1,742
Feb.	1,435	1,636	1,577
Mar.	1,865	1,644	1,541
Apr.	2,070	1,910	1,618
May	2,373	1,919	1,536
June	2,336	1,833	2,052
July	2,079	1,551	1,689
Aug.	2,165	2,112	1,911
Sept.	2,115	1,539	1,931
Oct.	....	2,206	1,795
Nov.	....	1,788	1,903
Dec.	....	1,483	1,822
Totals	....	21,219	21,117

YEARLY TOTALS

1954	18,396	1951	25,936
1953	20,444	1950	20,977
1952	20,911	1949	13,743

U. S. Bureau of the Census.

Castings

METALWORKING FACTS AND FIGURES

STEEL CASTINGS

Shipments—Net Tons

	Carbon	Alloy, Including Stainless	For Sale	For Own Use	Total
1957					
9 Mo.	1,036,934	334,958	1,055,970	315,922	1,371,892
Jan.	125,389	43,851	133,826	35,414	169,240
Feb.	114,805	40,127	121,667	33,265	154,932
Mar.	121,089	38,965	124,416	35,638	160,054
Apr.	122,894	39,604	124,549	37,949	162,498
May	124,840	39,735	125,431	39,144	164,575
June	116,759	36,888	119,353	34,294	153,647
July	91,730	30,288	90,037	31,981	122,018
Aug.	113,167	32,759	111,080	34,846	145,926
Sept.	106,261	32,741	105,611	33,391	139,002
Oct.	......	......	......	......	......
Nov.	......	......	......	......	......
Dec.	......	......	......	......	......
1956	1,444,768	487,219	1,512,290	419,697	1,931,987
Jan.	116,092	42,526	123,343	35,275	158,618
Feb.	123,279	42,119	128,598	36,800	165,398
Mar.	126,583	43,462	130,839	39,206	170,045
Apr.	121,723	41,985	125,015	38,693	163,708
May	134,919	43,308	142,025	36,202	178,227
June	122,483	42,178	129,147	35,514	164,661
July	88,971	29,013	96,350	21,634	117,984
Aug.	119,025	40,806	127,001	32,830	159,831
Sept.	116,905	38,141	121,705	33,341	155,046
Oct.	132,250	43,380	135,798	39,832	175,630
Nov.	122,212	41,902	126,900	37,214	164,114
Dec.	120,326	38,399	125,569	33,156	158,725
1955	1,088,489	442,205	1,166,706	363,988	1,530,694
Jan.	67,397	30,841	75,044	23,194	98,238
Feb.	74,709	31,721	80,729	25,701	106,430
Mar.	88,867	38,593	98,926	28,534	127,460
Apr.	84,247	35,806	92,237	27,816	120,053
May	85,950	36,515	92,713	29,752	122,465
June	93,417	40,470	102,457	31,430	133,887
July	68,094	29,781	71,170	26,705	97,875
Aug.	91,245	35,161	96,290	30,116	126,406
Sept.	100,775	40,068	107,622	33,221	140,843
Oct.	105,345	40,329	110,409	35,265	145,674
Nov.	111,571	40,810	116,908	35,473	152,381
Dec.	116,872	42,110	122,201	36,781	158,982
1954	802,811	381,285	878,360	305,736	1,184,096
1953	1,276,729	557,468	1,400,013	434,184	1,834,197
1952	1,375,233	552,709	1,476,242	451,700	1,927,942
1951	1,541,480	508,574	1,506,903	543,151	2,050,054
1950	1,129,588	350,999	1,081,650	398,937	1,480,587

U. S. Bureau of the Census.

MALLEABLE IRON CASTINGS

Shipments Net Tons

	For Sale	For Own Use	Total
1957			
9 Mo. ...	401,701	255,279	656,980
Jan.	51,508	34,469	85,977
Feb.	46,729	31,299	78,028
Mar.	48,311	29,702	78,013
Apr.	51,320	28,951	80,271
May	46,277	30,227	76,504
June	44,639	27,917	72,556
July	34,876	22,872	57,748
Aug.	39,644	25,782	65,426
Sept.	38,397	24,060	62,457
Oct.	......	......	......
Nov.	......	......	......
Dec.	......	......	......
1956	557,636	394,232	951,868
Jan.	54,618	38,944	93,562
Feb.	54,466	39,067	93,533
Mar.	46,266	40,675	86,941
Apr.	47,064	36,256	83,320
May	51,053	29,085	80,138
June	45,022	30,613	75,635
July	31,300	23,040	54,340
Aug.	43,479	30,943	74,422
Sept.	41,902	27,478	69,380
Oct.	50,219	31,309	81,528
Nov.	47,979	34,738	82,717
Dec.	44,268	32,084	76,352
1955	652,552	452,223	1,104,775
Jan.	48,000	34,028	82,028
Feb.	48,721	37,258	85,979
Mar. ..	60,063	42,301	102,364
Apr.	57,397	43,829	101,226
May	57,317	41,080	98,397
June	60,261	39,195	99,456
July ...	44,914	30,656	75,570
Aug.	48,126	34,322	82,448
Sept.	55,471	31,744	87,215
Oct. ..	53,804	37,062	90,866
Nov. ..	58,069	41,211	99,280
Dec.	60,409	39,537	99,946
1954	461,925	360,091	822,016
1953	578,749	391,757	970,506
1952	573,472	352,648	926,120
1951	656,076	429,165	1,085,241
1950	536,945	405,279	942,224
1949	373,313	349,585	722,898
1948	527,192	413,992	941,184
1947	514,195	384,605	898,800
1946	452,355	299,673	752,028
1945	520,887	269,844	790,731
1944	619,588	258,645	878,233
1943	653,884	190,755	844,639
1942	590,804	155,204	746,008
1941	619,365	212,808	832,173

U. S. Bureau of the Census.

HIGH ALLOY CASTINGS

Estimated Production by All U. S. Producers—Pounds

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1957	31,481,300*	34,315,100*	8,400,000*	74,196,400*
1st Qtr. ..	9,540,900†	10,034,000†	2,500,000†	22,074,900†
2nd Qtr. ..	7,781,500†	9,142,100†	2,090,000†	19,013,600†
3rd Qtr. ..	6,658,900†	7,339,000†	1,850,000†	15,847,900†
4th Qtr. ..	7,500,000*	7,800,000*	1,960,000*	17,260,000*
1956	37,987,500	36,705,800	10,553,700	85,247,000
1st Qtr. ..	9,147,200	8,458,900	2,321,800	19,927,900
2nd Qtr. ..	9,662,600	9,643,900	3,060,600	22,367,100
3rd Qtr. ..	9,020,100	8,767,200	2,532,900	20,320,200
4th Qtr. ..	10,157,600	9,835,800	2,638,400	22,631,800

	Heat Resistant	Corrosion Resistant	Abrasion Resistant	Totals
1955	30,499,600	25,741,600	10,214,100	66,455,300
1954	29,108,300	24,316,300	8,426,600	61,851,200
1953	39,311,600	29,151,600	8,706,900	77,170,100
1952	40,807,600	26,197,800	7,827,500	74,832,900
1951	38,277,000	28,771,600	6,132,300	73,180,900
1950	26,894,000	19,033,200	3,321,200	49,248,400
1949	19,791,700	12,997,100	1,500,700	34,289,500
1948	24,030,400	16,285,200	2,525,300	42,840,900
1947	21,505,100	16,346,900	1,534,500	39,386,500
1946	20,398,800	15,150,400	1,860,700	37,409,900
1945	23,002,700	12,276,200	1,482,000	36,760,900
1944	27,698,800	9,662,100	1,365,700	38,726,600

*Estimated. †Preliminary.
Alloy Casting Institute.

NONFERROUS CASTINGS

Zinc and Zinc-Base Alloy Castings

Shipments—Thousands of Pounds

	Die	All Other	Total
1957			
9 Mo.	488,891	4,091	492,982
Jan.	67,456	508	67,964
Feb.	59,324	469	59,793
Mar.	60,877	501	61,378
Apr.	54,533	449	54,982
May	53,085	480	53,565
June	48,920	436	49,356
July	48,005	374	48,379
Aug.	49,360	469	49,829
Sept.	47,331	405	47,736
Oct.	....	....	.....
Nov.	....	....	.....
Dec.	....	....	.....
1956	687,421	6,896	694,317
Jan.	67,817	704	68,521
Feb.	66,319	736	67,055
Mar.	65,553	678	66,231
Apr.	58,103	612	58,715
May	52,210	466	52,676
June	47,805	445	48,250
July	42,234	465	42,699
Aug.	52,284	509	52,793
Sept.	46,316	495	46,811
Oct.	65,921	589	66,510
Nov.	64,904	539	65,443
Dec.	57,955	628	58,583
1955	769,480	8,520	778,000
Jan.	57,519	671	58,190
Feb.	57,525	672	58,197
Mar.	70,858	738	71,596
Apr.	70,692	719	71,411
May	62,684	710	63,394
June	65,663	666	66,329
July	46,822	539	47,361
Aug.	61,702	720	62,422
Sept.	61,114	690	61,804
Oct.	70,815	714	71,529
Nov.	74,187	773	74,960
Dec.	69,899	908	70,807
1954	513,902	6,556	520,458
1953	515,033	6,220	521,253

U. S. Bureau of the Census.

Magnesium and Magnesium-Base Alloy Castings

Shipments—Thousands of Pounds

	1957	1956	1955	1954	1953
Jan.	3,207	2,959	2,307	2,451	3,112
Feb.	2,661	2,977	2,158	2,209	3,274
Mar.	2,970	3,046	2,576	2,425	3,403
Apr.	2,896	3,140	2,621	2,089	3,332
May	2,832	3,021	2,397	1,762	2,705
June	2,973	2,949	2,366	2,062	3,063
July	2,544	2,810	1,913	1,954	2,287
Aug.	2,315	3,059	2,172	2,190	2,490
Sept.	2,279	3,079	2,468	2,095	2,455
Oct.	....	3,442	2,299	2,092	3,024
Nov.	....	2,892	2,324	2,161	2,681
Dec.	....	2,794	2,253	2,287	2,691
Totals	....	36,168	27,854	25,777	34,517

YEARLY SHIPMENTS

1952	34,857	1950	15,224
1951	30,825	1949	11,053

U. S. Bureau of the Census.

Aluminum and Aluminum-Base Alloy Castings

Shipments—Thousands of Pounds

	Sand	Permanent Mold	Die	Other	Total
1957					
9 Mo.	112,868	176,448	284,879	1,321	575,516
Jan.	14,201	20,963	37,194	641	72,999
Feb.	13,366	21,707	34,311	67	69,451
Mar.	13,914	22,974	37,521	118	74,527
Apr.	14,287	20,376	33,493	128	68,284
May	12,705	20,708	31,602	93	65,108
June	11,585	17,180	29,700	82	58,547
July	10,477	16,322	25,339	35	52,173
Aug.	10,966	18,398	26.319	52	55,735
Sept.	11,367	17,820	29,400	105	58,692
Oct.	.....	.....	.....	....	.....
Nov.	.....	.....	.....	....	.....
Dec.	.....	.....	.....	....	.....
1956	171,781	245,421	376,230	1,149	794,581
Jan.	15,839	24,528	33,262	78	73,707
Feb.	15,537	23.963	32,959	46	72,505
Mar.	16,575	22,816	33,974	112	73,477
Apr.	14,710	20,718	31,792	134	67,354
May	15,613	19,669	29,823	142	65,247
June	13,462	19,067	25,037	100	57,666
July	12,412	16,388	23.501	119	52,420
Aug.	13,113	18.067	29,563	96	60,839
Sept.	12,367	17,855	31,649	71	61,942
Oct.	14,402	21,120	37,792	101	73,415
Nov.	14,346	20,673	33,938	101	69,058
Dec.	13,405	20,557	32,940	49	66,951
1955	165,482	298,349	355,203	1,746	820,780
1954	156,555	214,407	245,291	6,801	623,054
1953	214,553	200,025	239,330	4,114	658,022
1952	194,616	146,883	169,732	7,748	518,979
1951	193,378	160,011	151,465	10,277	515,131
1950	184,782	181,366	167,201	9,733	543,082
1949	122,604	123,523	98,340	7,311	351,778

U. S. Bureau of the Census.

Copper and Copper-Base Alloy Castings

Shipments—Thousands of Pounds

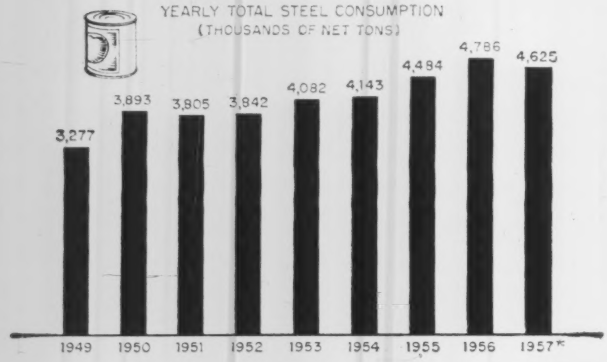
	Sand	Permanent Mold	Die	Other	Total
1957					
9 Mo.	591,878	35,001	7,969	22,810	657,658
Jan.	73,702	4,510	1,008	2,805	82,025
Feb.	64,346	4,188	874	2,676	72,084
Mar.	69,258	4,445	878	2,837	77,418
Apr.	69,141	4,316	894	2,816	77,167
May	67,251	4,421	953	2,722	75,347
June	63,910	3 590	868	2,591	70,959
July	54,847	3,010	825	1,939	60,621
Aug.	64,953	3,278	799	2,203	71,233
Sept.	64,470	3,243	870	2,221	70,804
Oct.	.....	....	....	....	.....
Nov.	.....	....	....	....	.....
Dec.	.....	....	....	....	.....
1956	866,545	57,522	10,075	32,164	966,306
Jan.	80,119	6,135	797	2,717	89,768
Feb.	82,246	5,888	799	2,847	91,780
Mar.	85,896	6,299	780	3,110	96,085
Apr.	81,335	5,835	719	2,789	90,678
May	80,157	5,398	754	2,884	89,193
June	70,378	5,052	753	2,854	79,037
July	55,029	3,193	503	2,200	60,925
Aug.	70,481	3,805	902	2,431	77,619
Sept.	64,889	3,930	927	2,363	72,109
Oct.	73,060	4,104	1,118	2,767	81,049
Nov.	65,024	4,114	1,055	2,673	72,866
Dec.	57,931	3,769	968	2,529	65,197
1955	905,867	63,111	8,512	31,408	1,008,898
1954	751,917	48,848	6,509	27,394	834,668
1953	888,369	61,316	10,077	30,734	990,496
1952	910,862	63,865	8,259	26,924	1,009,910
1951	1,075,437	69,883	12,516	39,607	1,197,443
1950	953,590	55,614	15,099	32,670	1,056,973
1949	671,080	38,767	9,499	24,475	743,821

U. S. Bureau of the Census.

Containers & Closures

METAL CANS

Shipments in Terms of Net Tons of Steel Consumed



	Food Cans	Nonfood Cans	Total	For Sale
1957				
9 Mo.	2,226,349	1,392,980	3,619,329	3,123,125
Jan.	183,293	131,195	314,488	262,984
Feb.	161,659	118,736	280,395	234,194
Mar.	178,913	144,878	323,791	267,709
Apr.	335,566	170,859	506,425	446,335
May	175,847	162,728	338,575	280,919
June	203,957	156,573	360,530	308,197
July	271,056	181,938	452,994	404,235
Aug.	369,117	177,111	546,228	488,184
Sept.	346,941	148,962	495,903	430,371
Oct.	......	......	......	......
Nov.	......	......	......	......
Dec.	......	......	......	......
1956	3,011,980	1,773,691	4,785,671	4,113,401
Jan.	172,860	120,271	293,131	244,735
Feb.	176,999	122,671	299,670	251,964
Mar.	194,116	147,121	341,237	288,243
Apr.	322,941	160,687	483,628	424,140
May	183,298	155,069	338,367	279,136
June	224,299	180,784	405,083	345,430
July	266,336	182,193	448,529	396,151
Aug.	418,959	174,953	593,912	531,035
Sept.	392,158	141,103	533,261	458,039
Oct.	352,673	163,867	516,540	453,970
Nov.	154,249	110,920	265,169	219,267
Dec.	153,092	114,052	267,144	221,290
1955	2,801,601	1,682,398	4,483,999	3,909,855
Jan.	170,869	108,682	279,551	239,950
Feb.	155,503	105,011	260,514	223,927
Mar.	172,794	136,326	309,120	265,456
Apr.	183,251	142,840	326,091	273,505
May	223,587	157,043	380,630	329,880
June	230,803	167,854	398,657	347,362
July	266,735	161,371	428,106	385,917
Aug.	391,817	173,285	565,102	511,667
Sept.	355,685	155,703	511,388	443,322
Oct.	343,742	157,689	501,431	445,325
Nov.	150,276	102,382	252,658	212,913
Dec.	156,539	114,212	270,751	230,631
1954	2,605,124	1,538,205	4,143,329	3,657,604
1953	2,614,764	1,467,490	4,082,254	3,571,489
1952	2,554,874	1,287,296	3,842,170	3,340,899
1951	2,558,591	1,245,960	3,804,551	3,309,592
1950	2,550,949	1,342,435	3,893,384	3,423,602
1949	2,261,432	1,015,493	3,276,925	2,845,709

U. S. Bureau of the Census.

*Estimated.

Commercial Closures

Shipments—in Thousands of Units

	Metal Caps	Plastic Caps†
1957		
9 Mo.	10,366,218	2,219,46
Jan.	961,127	265,93
Feb.	1,038,681	249,72
Mar.	997,787	267,12
Apr.	1,073,073	257,73
May	1,187,338	240,941
June	1,113,686	228,417
July	1,289,119	231,61
Aug.	1,435,712	248,848
Sept.	1,269,665	259,098
Oct.	......	......
Nov.	......	......
Dec.	......	......
1956	11,272,810	3,084,55
Jan.	951,906	257,36
Feb.	1,055,890	256,01
Mar.	1,073,711	275,22
Apr.	1,119,005	243,67
May	1,208,737	247,72
June	1,239,213	253,79
July	1,362,352	242,52
Aug.	1,416,915	252,77
Sept.	1,112,063	258,7
Oct.	1,422,743	325,904
Nov.	1,023,451	242,487
Dec.	1,283,820	228,26
1955	14,135,632	2,850,36
1954	12,705,438	2,543,8
1953	11,854,40	2,609,22
1952	10,920,941	2,166,85

†Not including caps for collapsible tubes.
U. S. Bureau of the Census.

Tin Mill Products Consumed in Producing Closures‡

Consumption in Terms of Base Boxes

	Commercial Metal Caps	Crowns	Home Canning Closures*
1957			
Jan.	253,397	226,189	58,332
Feb.	223,285	235,412	55,981
Mar.	250,435	289,441	67,449
Apr.	287,753	292,083	75,658
May	251,806	278,431	77,857
1956	2,960,059	2,912,047	676,445
Jan.	225,428	275,127	51,757
Feb.	246,580	287,066	57,901
Mar.	276,718	334,160	67,941
Apr.	268,192	369,544	65,350
May	197,702	237,612	77,867
June	243,117	201,441	79,012
July	261,280	242,397	44,087
Aug.	275,716	234,059	69,711
Sept.	232,971	184,690	44,024
Oct.	276,673	210,552	45,955
Nov.	237,773	161,459	38,664
Dec.	214,879	173,637	34,497
1955	2,910,576	3,179,904	671,784
1954	2,629,231	3,014,165	658,935
1953	2,461,563	3,158,560	685,042
1952	2,250,732	3,286,200	624,017
1951	2,325,417	3,237,970	n.a.
1950	2,601,675	3,100,418	n.a.
1949	1,957,495	2,793,078	n.a.

‡This series discontinued after May, 1957.
*Includes milk bottle closures.
n.a.—not available.
U. S. Bureau of the Census.

Crowns

Shipments—In Gross

	1957	1956	1955
Jan.	20,854,903	22,835,265	21,333,123
Feb.	21,131,071	24,599,123	19,961,66
Mar.	26,313,951	35,063,728	26,958,841
Apr.	27,724,112	63,888,686	28,544,237
May	32,325,995	17,837,940	30,426,551
June	31,263,410	16,454,164	32,963,261
July	33,611,886	22,914,009	32,927,590
Aug.	30,317,394	25,999,603	33,015,764
Sept.	25,582,392	20,757,026	27,363,804
Oct.	....	20,438,847	21,803,654
Nov.	....	18,126,773	22,053,570
Dec.	....	21,287,667	26,349,69
Totals	....	310,202,831	326,733,012

YEARLY TOTALS

1954 313,741,265
1953 315,956,45

U. S. Bureau of the Census.

Aluminum Consumed in Producing Closures†

Pounds

	Commercial Closures	Milk Bottle Closures	Foil Liners	Total
1957				
Jan.	636,342	586,173	143,657	1,366,172
Feb.	544,096	450,698	151,740	1,146,534
Mar.	876,793	483,098	198,401	1,558,292
Apr.	959,386	473,345	172,705	1,605,436
May	993,835	503,913	221,526	1,719,274
1956	10,735,014	6,347,696	2,066,711	19,149,421
Jan.	722,868	545,622	199,216	1,467,706
Feb.	728,938	526,209	200,825	1,455,972
Mar.	896,050	571,766	214,231	1,682,047
Apr.	971,999	495,014	207,736	1,674,749
May	918,950	527,176	164,923	1,611,049
June	1,192,327	461,585	161,876	1,815,788
July	1,017,142	589,098	215,150	1,821,390
Aug.	964,233	572,181	203,329	1,739,743
Sept.	911,552	498,674	144,962	1,555,188
Oct.	996,986	646,020	125,087	1,768,093
Nov.	784,258	499,050	106,706	1,390,014
Dec.	629,711	415,301	122,670	1,167,682
1955	10,010,859	6,053,485	2,348,924	18,413,268
1954	9,072,888	4,846,299	2,423,771	16,342,958

†This series discontinued after May, 1957.

Heavy Steel Barrels and Drums

Shipments for Sale—Number of Units

	1957	1956	1955
Jan.	1,907,455	1,940,081	1,742,274
Feb.	1,803,450	1,982,997	1,746,912
Mar.	1,911,376	2,250,692	2,124,565
Apr.	1,888,855	2,294,404	1,989,904
May	1,930,765	2,468,812	2,062,366
June	1,869,968	2,659,143	2,513,715
July	1,759,847	2,378,715	2,077,593
Aug.	1,770,280	2,035,491	2,230,442
Sept.	1,565,109	1,739,954	2,032,407
Oct.	....	1,913,725	2,075,022
Nov.	....	1,878,270	2,042,455
Dec.	....	1,873,663	2,181,688

YEARLY TOTALS

1956	25,406,947	1952	21,028,291
1955	24,822,343	1951	29,762,990
1954	22,050,759	1950	26,240,548
1953	23,558,440	1949	23,109,638

Light Steel Barrels and Drums

Shipments for Sale—Number of Units

	1957	1956	1955
Jan.	906,002	786,867	685,788
Feb.	799,897	765,166	677,844
Mar.	833,533	775,825	770,232
Apr.	874,809	821,589	774,951
May	909,302	926,424	851,667
June	901,210	893,601	888,666
July	928,566	851,086	790,278
Aug.	941,461	812,750	843,978
Sept.	922,963	755,229	829,042
Oct.	....	846,654	743,466
Nov.	....	771,662	770,963
Dec.	....	671,302	785,179

YEARLY TOTALS

1956	9,678,155	1952	7,602,519
1955	9,412,054	1951	8,290,340
1954	7,737,199	1950	7,816,535
1953	7,740,669	1949	6,079,913

Steel Shipping Packages, Kegs and Pails

Shipments for Sale—Number of Units

	1957	1956	1955
Jan.	5,788,072	5,788,072	5,036,886
Feb.	5,300,574	5,924,450	4,859,792
Mar.	5,999,239	6,557,724	6,147,901
Apr.	6,361,528	6,772,588	6,441,670
May	6,870,294	7,162,451	6,779,107
June	6,786,562	7,845,745	7,399,292
July	6,942,631	7,365,417	6,625,379
Aug.	6,455,788	7,423,858	7,254,761
Sept.	5,769,717	6,198,241	6,470,152
Oct.	....	6,906,990	6,594,560
Nov.	....	6,057,127	5,840,747
Dec.	....	5,293,640	5,451,096

YEARLY TOTALS

1956	79,296,306	1953	67,007,926
1955	74,901,343	1952	61,285,782
1954	67,062,331	1951	73,681,480

U. S. Bureau of the Census.

STEEL & IRON REQUIRED FOR PRODUCTS

Figures show pounds required to make item or required for installation, except where finished weight is specified. Weights are not intended to be typical or average. They are for particular models or types. Weights less than 1 lb are shown in ounces and are indicated by abbreviation oz.

PRODUCT	Date estimate was published	IRON AND STEEL (pounds)
Bus (50 seats)	Dec. 1951	12,918
Desk (60 x 30 x 29 in.), finished weight	Dec. 1952	245.81
Freight Cars:	June 1949	
Boxcar (40 ft 6 in.), 50-ton capacity		41,540
Covered Hopper, 70-ton capacity		52,940
Flat, 50-ton capacity		47,660
Hopper, 50-ton capacity		41,920
Ore, 70-ton capacity		42,300
Refrigerator, 40-ton capacity		43,940
Grain Combine	June 1950	6,829.77
Hay Baler (10 tons per hour capacity)	Oct. 1951	3,716.58
Lathe, Turret (standard size)	Apr. 1947	8,056
Locomotive, diesel-electric, 1500 hp	Apr. 1949	200,700
Motor, Electric (finished weight), ¾ hp	June 1952	18.76
Motor, Electric (finished weight), 5000 hp	June 1952	178,000
Printing Press (4-color, sheet fed gravure)	Oct. 1950	110,900
Railroad Freight Car Truck	Oct. 1949	6,868
Railroad Passenger Car Truck	Oct. 1949	18,460
Railroad Sleeping Car (21-roomette)	June 1951	115,662
Ship, "Independence"	Aug. 1951	37,090,000
		STEEL‡
Automobile (1952 model, 4-door sedan)	Oct. 1953	3,542
Bicycle (man's 26 in., de luxe)	Oct. 1952	63.81
Lawn Mower (hand operated)	June 1947	27.60
Tractor, Farm (wheel type)	Dec. 1946	1,512.82

Containers, By Types (finished weights): ....Feb. 1948

Baby Food	1.888 oz	Lard (3 lb)	8.288 oz
Condensed Milk	2.48 oz	Meat (Square, 12 oz)	2.848 oz
Fish (sardine, No. 1 flat)	2.5 oz	Olive Oil (Square, 1 qt)	4.96 oz
Fish (tuna, No. 1)	3.168 oz	Paint (1 gal)	15.968 oz
Fruit (No. 3)	5.344 oz	Soup (No. 2)	3.808 oz
Fruit Juice (No. 10)	11.08 oz	Vegetable (No. 5)	5.92 oz
Grease (1 lb)	3.776 oz		

House, Six-Room§ (finished weights): ....Oct. 1949

Bathroom	300	Lath	1,800
Conduit	140	Laundry (see below)	....
Doors, Steel	160	Nails and Wire	600
Flashing and Miscellaneous Sheets	200	Pipe	1,290
Frames and Sills	480	Radiator Grilles	75
Gutters and Downspouts	475	Screen	32
Hardware	90	Structural Shapes and Columns	680
Heating Equipment	640	Windows	800
Kitchen (see below)	...		

Kitchen-Laundry Combination† (finished weights): ......Apr. 1953

Clothes Dryer	216	Refrigerator	229
Clothes Washer	216	Sink Bowl (double)	22
Dishwasher with Cabinet	150	Stainless Trim for Counter Edge	2
Electrical Raceway system	63	Steel Stool	15
Freezer	283	Stove	254
Garbage Disposer Unit	15	Toaster	7
Ironer	186	Utensils and Cutlery	50
Kitchen Cabinets	887	Venetian Blinds (2)	14
Metal Table with Porcelain Enamel Top	35	Ventilator for Stove	7
Mixer	8		

Tools, Garden: ....June 1955

Fifteen-tooth Bow Rake	2.91	Hedge Shears	3.10
Four-lb Single Bit Ax	6.09	Medium-weight Spading Fork	2.62
Four-tooth Garden Cultivator	0.74	Pruning Shears	1.12
Garden Hoe	1.21	Short-handled Grass Hook	0.84
Garden Spade	4.83	Turf Edger	1.77
Garden Trowel	0.90	Weed Scythe Blade	2.54
Grass and Weed Cutter	1.87		

Tools, Hand: ....Feb. 1953

Ball Peen Hammer	1.64	Mechanic's Double End Wrench	0.442
Chisel	6.8 oz	Pick	6.36
Combination Pliers	10.8 oz	Sledge	10.6
Crowbar	19.08	Solid Punch	2.18 oz
Drift Pin	1.1	Standard Screw Driver	0.27
Four-Way Wrench	2.33	Timber Felling Wedge	5.3
Mattock	5.3	Wrench	2.75
Maul	10.6		

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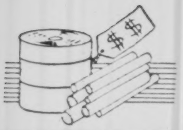
‡Iron, if any, not determined.

§Not all the uses listed are necessarily found in the same house. The list indicates where steel has been found advantageous.

†List does not give all possible uses of steel in a kitchen and is intended only to indicate the many functions of steel in that room.

American Iron & Steel Institute



Prices

1957 WEEKLY INDEX OF FINISHED STEEL PRICES

U. S. Bureau of Labor Statistics—1947-49=100

Week Ended	Index	Week Ended	Index	Week Ended	Index	Week Ended	Index
Jan. 1......	171.1	Apr. 2......	174.0	July 2......	180.7	Oct. 1......	181.7
Jan. 8......	171.1	Apr. 9......	174.0	July 9......	181.3	Oct. 8......	181.7
Jan. 15......	171.1	Apr. 16......	174.0	July 16......	181.5	Oct. 15......	181.7
Jan. 22......	171.6	Apr. 23......	174.0	July 23......	181.5	Oct. 22......	181.7
Jan. 29......	171.7	Apr. 30......	174.5	July 30......	181.5	Oct. 29......	181.7
Jan. Avg..	171.1	Apr. Avg..	174.0	July Avg..	181.5	Oct. Avg..	181.7
Feb. 5......	171.9	May 7......	174.4	Aug. 6......	181.5	Nov. 5......	181.7
Feb. 12......	173.1	May 14......	174.4	Aug. 13......	181.5	Nov. 12......	181.7
Feb. 19......	173.8	May 21......	174.4	Aug. 20......	181.5	Nov. 19......	181.7
Feb. 26......	173.8	May 28......	174.4	Aug. 27......	181.5	Nov. 26......	181.7
Feb. Avg..	173.1	May Avg..	174.4	Aug. Avg..	181.5	Nov. Avg..	181.7
Mar. 5......	173.9	June 4......	174.3	Sept. 3......	181.5	Dec. 3......	181.7
Mar. 12......	173.9	June 11......	174.3	Sept. 10......	181.5	Dec. 10......	....
Mar. 19......	174.0	June 18......	174.3	Sept. 17......	181.5	Dec. 17......	....
Mar. 26......	174.0	June 25......	174.3	Sept. 24......	181.5	Dec. 24......	....
Mar. Avg..	173.9	June Avg..	174.3	Sept. Avg..	181.5	Dec. 31......	....

Beehive Metallurgical Coke

Average Price—Net Ton

	1957	1956	1955	1954
Connellsville, furnace	$15.22	$14.35	$13.70	$14.50
Connellsville, foundry	18.12	16.97	16.65	16.75

Oven Foundry Coke

Average Price—Net Ton

Ovens	1957	1956	1955	1954
Kearny, N. J. ..	$29.77	$27.55	$24.77	$24.00
Milwaukee	30.50	28.33	25.69	25.25

Lake Superior Iron Ore

(Per gross ton; 51.50% iron)

	1957	1956	1955	1954
Bessemer Old Range	$11.85	$11.25	$10.40	$10.30
Bessemer Mesabi ..	11.60	11.00	10.25	10.05
Nonbessemer Old Range	11.70	11.10	10.25	10.15
Nonbessemer Mesabi	11.45	10.85	10.10	9.90
High Phosphorus ..	11.45	10.85	10.00	9.90

FINISHED STEEL—WEIGHTED PRICE COMPOSITE

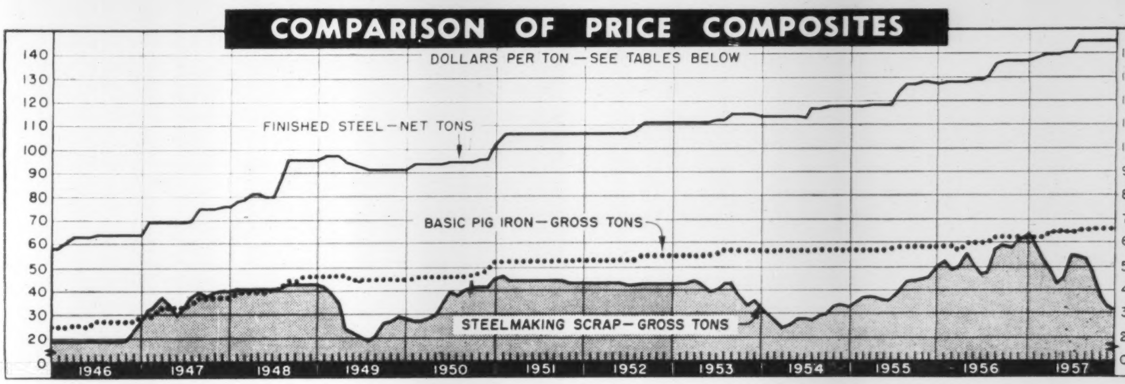
(Based on average shipments and prices during five-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold rolled sheets, galvanized sheets, hot and cold rolled strip)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957..	225.92	226.81	227.41	227.41	228.59	228.59	237.04	239.15	239.15	239.15	239.15	239.15	233.13
1956..	209.10	209.10	209.10	209.10	210.45	210.45	210.45	221.90	225.71	225.58	225.92	225.92	216.06
1955..	194.53	194.53	194.53	194.53	194.53	194.53	207.59	207.56	207.56	208.90	208.90	208.90	201.38
1954..	189.74	189.74	189.74	189.74	189.74	189.75	194.19	194.19	194.19	194.53	194.53	194.53	192.05
1953..	181.31	181.31	181.31	181.31	182.24	186.06	189.35	189.38	189.80	189.91	189.91	189.74	185.97
1952..	171.92	171.92	171.92	171.92	171.92	171.92	173.83	181.31	181.31	181.31	181.31	181.31	175.99
1951..	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92	171.92
1950..	156.13	156.13	156.13	156.13	156.13	156.54	156.69	156.95	156.99	157.53	157.76	167.87	157.57
1949..	155.05	155.05	154.85	154.01	152.90	152.90	152.80	152.52	152.52	152.52	152.52	154.75	153.53
1948..	132.93	134.56	135.91	135.91	135.02	134.56	143.08	151.99	151.86	151.86	151.86	151.86	142.62
1947..	117.90	118.67	118.67	118.67	118.67	118.67	120.39	128.96	128.96	128.96	129.28	129.28	123.09
1946..	101.87	106.82	111.62	111.62	111.62	111.86	112.04	112.04	112.04	112.04	112.04	112.82	110.70
1945..	100.32	100.65	100.65	100.65	101.10	101.78	101.78	101.85	101.87	101.87	101.87	101.87	101.36
1944..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1943..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1942..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16
1941..	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16	99.16

FINISHED STEEL—ANNUAL PRICE AVERAGES

(Per net ton, Pittsburgh)

	SHEETS			STRIP		Tin	BARS				Basic	Standard
	H.R.	C.R.	Gal.	H.R.	C.R.	Plate	H.R.	C.F.	Plates	Shapes	Wire	Nails
1957	$95.92	$117.90	$128.90	$95.92	$139.90	$203.67	$104.88	$141.35	$99.42	$103.26	$148.35	$174.25
1956	89.27	109.86	120.56	89.27	129.75	194.67	96.35	129.95	92.77	95.17	136.75	157.19
1955	83.75	102.75	113.00	83.75	120.12	183.00	89.50	113.00	87.25	88.50	120.00	144.50
1954	79.75	97.25	107.25	79.75	112.00	179.50	84.50	106.00	83.25	83.50	112.75	134.00
1953	77.60	93.70	103.70	85.34	111.25	179.00	81.20	101.52	80.20	79.75	108.26	129.08
1952	74.52	88.95	98.38	79.51	104.39	176.17	76.17	94.25	75.73	74.73	101.88	123.03
1951	73.00	87.00	96.00	77.60	101.60	174.00	74.00	91.00	74.00	73.00	98.60	120.00
1950	67.50	82.42	88.67	68.33	86.29	150.00	69.42	83.29	70.33	68.42	91.13	107.67
1949	65.22	80.08	88.00	67.75	84.33	155.00	67.55	80.04	68.75	65.24	84.05	105.92
1948	60.17	74.83	82.80	62.40	80.36	135.75	62.84	75.63	63.84	60.17	80.10	107.33
1947	52.60	67.03	74.05	52.60	67.03	116.00	54.60	67.03	55.53	52.53	70.67	84.44
1946	48.03	64.80	79.50	47.33	60.56	104.38	49.46	61.21	49.38	46.38	60.25	69.61
1945	43.92	61.00	73.50	42.00	56.00	100.00	44.25	53.83	44.50	42.00	53.83	57.08
1944	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1943	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1942	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1941	42.00	61.00	70.00	42.00	56.00	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1940	41.80	60.80	70.00	41.75	55.75	100.00	43.00	53.00	42.00	42.00	52.00	51.00
1939	41.25	62.08	70.00	41.25	57.08	100.00	43.75	53.33	42.00	42.00	52.00	49.17
1938	45.42	66.67	72.92	45.25	61.08	106.00	47.00	56.00	43.50	43.50	55.00	52.00
1937	47.08	69.92	74.50	47.08	62.75	104.33	48.08	56.75	44.25	44.25	56.92	53.25
1936	38.25	60.00	63.25	38.25	52.33	105.00	38.50	44.42	37.00	37.00	48.17	42.83
1935	37.00	59.00	62.00	37.00	52.00	105.00	36.33	40.00	36.00	36.00	46.00	50.58



FINISHED STEEL—ARITHMETICAL PRICE COMPOSITE

(In dollars per net ton, computed from industry-wide prices on carbon steel: Hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, and standard and line pipe. Based on basing point prices through June, 1948; mill prices for subsequent months.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957.......	$138.60	$139.38	$139.71	$139.71	$140.24	$140.24	$146.10	$146.19	$146.19	$146.03	$146.03	$146.03	$142.87
1956.......	128.02	128.02	128.02	128.02	128.98	128.98	130.85	136.28	137.75	137.48	137.66	137.79	132.32
1955.......	117.82	117.82	118.40	118.45	118.45	118.45	124.59	127.41	127.41	128.14	128.14	127.75	122.74
1954.......	113.91	113.91	113.75	113.70	113.70	113.20	117.52	117.74	117.77	117.95	117.95	117.95	115.75
1953.......	110.98	110.98	110.98	110.98	111.13	112.49	112.51	115.56	115.56	115.42	115.18	114.41	113.02
1952.......	106.32	106.32	106.32	106.32	106.32	106.32	107.25	110.98	110.98	110.98	110.98	110.98	108.34
1951.......	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32	106.32
1950.......	92.92	93.09	93.18	93.19	93.65	94.35	94.36	94.44	94.50	94.91	95.09	100.76	94.54
1949.......	97.75	97.77	97.17	94.18	93.36	92.06	91.82	91.62	91.55	91.62	91.64	91.89	93.54
1948.......	78.26	79.86	81.14	81.14	80.27	80.27	86.18	95.05	95.05	95.05	95.16	95.50	86.91
1947.......	69.59	69.82	69.82	69.82	69.82	69.82	70.80	75.41	75.41	75.41	76.09	76.15	72.33
1946.......	58.27	60.91	63.54	63.54	63.54	64.09	64.45	64.45	64.45	64.45	64.45	64.75	63.41

STEELMAKING SCRAP PRICE COMPOSITE

Average of No. 1 heavy melting steel scrap prices (per gross ton) at Pittsburgh, Chicago, eastern Pennsylvania. December and 1957 averages are estimated.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957.......	$58.96	$53.41	$49.63	$43.57	$45.75	$54.89	$54.67	$53.33	$47.73	$37.37	$33.17	$31.50	$47.00
1956.......	52.17	48.96	50.21	54.90	50.34	46.04	47.70	57.13	59.08	57.27	61.83	64.29	54.16
1955.......	34.95	36.79	37.50	36.73	34.87	35.44	39.67	43.97	44.42	45.17	46.08	50.37	40.50
1954.......	29.05	26.91	24.37	25.67	28.00	27.92	27.42	28.80	29.94	32.25	33.33	32.58	28.85
1953.......	43.00	43.00	44.05	42.88	39.17	40.50	43.51	43.40	36.93	32.75	35.00	32.10	39.69
1952.......	43.00	43.00	43.00	43.00	43.00	42.63	42.60	43.00	43.00	43.00	43.00	43.00	42.94
1951.......	46.33	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	43.60	43.00	43.00	43.99
1950.......	26.93	27.52	28.23	29.40	33.82	39.25	37.04	40.00	40.93	41.37	41.33	45.50	35.94
1949.......	41.54	38.48	34.60	24.06	22.29	20.85	19.21	20.86	26.07	26.71	28.96	28.03	27.64
1948.......	40.75	40.48	40.21	40.41	40.67	40.67	41.43	43.33	43.33	43.25	43.25	43.25	41.75
1947.......	31.20	33.50	37.25	33.94	29.75	32.48	37.23	39.00	37.83	39.85	40.42	40.13	36.05
1946.......	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	19.17	22.22	27.69	20.13

BASIC PIG IRON PRICE COMPOSITE

Average of basic pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957.......	$62.18	$62.18	$64.17	$64.24	$64.24	$64.24	$65.29	$65.99	$65.99	$65.99	$65.99	$65.99	$64.71
1956.......	58.49	58.49	56.63	59.80	59.80	59.80	59.93	62.18	62.18	62.18	62.18	62.18	60.32
1955.......	56.04	56.01	56.04	56.04	56.04	56.04	57.88	58.49	58.49	58.49	58.49	58.49	57.29
1954.......	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04	56.04
1953.......	54.66	54.66	54.66	54.66	54.66	54.66	56.03	56.04	56.04	56.04	56.04	56.04	55.35
1952.......	52.16	52.16	52.16	52.16	52.16	52.16	52.66	54.66	54.66	54.66	54.66	54.66	53.24
1951.......	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16	52.16
1950.......	45.70	45.97	45.97	45.97	45.97	45.97	45.97	45.97	47.08	47.98	49.04	52.16	46.98
1949.......	46.26	46.22	46.22	46.16	45.66	45.60	45.60	45.60	45.60	45.60	45.60	45.60	45.81
1948.......	38.50	39.30	39.34	39.21	39.66	40.49	41.42	44.12	44.62	46.19	46.29	46.29	42.12
1947.......	29.56	29.59	32.40	32.49	32.49	32.49	33.82	36.06	36.14	36.18	36.38	36.31	33.66

MALLEABLE PIG IRON PRICE COMPOSITE

Average of malleable pig iron prices (per gross ton) at Bethlehem, Buffalo, Chicago, Cleveland, Pittsburgh, Granite City, Youngstown.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957.......	$63.41	$63.41	$65.70	$65.77	$65.77	$65.77	$66.66	$67.27	$67.27	$67.27	$67.27	$67.27	$66.07
1956.......	59.77	59.77	59.93	61.27	61.27	61.27	61.52	63.41	63.41	63.41	63.41	63.41	61.82
1955.......	57.27	57.27	57.27	57.27	57.27	57.27	59.15	59.77	59.77	59.77	59.77	59.77	58.47
1954.......	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27	57.27
1953.......	55.77	55.77	55.77	55.77	55.77	55.77	57.27	57.27	57.27	57.27	57.27	57.27	56.52
1952.......	53.27	53.27	53.27	53.27	53.27	53.27	53.77	55.77	55.77	55.77	55.77	55.77	54.35
1951.......	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27	53.27
1950.......	47.27	47.27	47.27	47.27	47.27	47.27	47.33	47.49	48.15	49.46	50.27	53.27	48.30
1949.......	47.39	47.34	47.34	47.31	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.27	47.30
1948.......	39.58	40.39	40.45	40.29	40.70	41.54	42.32	44.87	45.30	47.20	47.41	47.41	43.12
1947.......	30.79	30.79	33.50	33.71	33.71	33.71	34.94	37.07	37.16	37.19	37.49	37.40	34.79

No. 2 FOUNDRY PIG IRON PRICE COMPOSITE

Average of No. 2 foundry pig iron prices (per gross ton) at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg
1957.......	$62.63	$62.63	$64.63	$64.70	$64.70	$64.70	$65.77	$66.49	$66.49	$66.49	$66.49	$66.49	$65.18
1956.......	58.99	58.99	59.15	60.27	60.27	60.27	60.95	62.63	62.63	62.63	62.63	62.63	61.00
1955.......	56.54	56.54	56.54	56.54	56.54	56.54	58.38	58.99	58.99	58.99	58.99	58.99	57.71
1954.......	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54	56.54
1953.......	55.04	55.04	55.04	55.04	55.04	55.04	56.54	56.54	56.54	56.54	56.54	56.54	55.79
1952.......	52.54	52.54	52.54	52.54	52.54	52.54	53.04	55.04	55.04	55.04	55.04	55.04	53.62
1951.......	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54	52.54
1950.......	46.20	46.47	46.47	46.47	46.47	46.47	46.57	46.85	47.55	49.20	49.54	52.54	47.57
1949.......	47.39	47.34	47.34	47.31	47.27	47.27	46.08	46.10	46.10	46.10	46.10	46.10	46.28
1948.......	38.94	39.77	39.81	39.68	40.10	40.96	41.83	44.47	44.58	46.50	46.69	46.69	42.50
1947.......	30.17	30.17	32.80	32.99	32.99	32.99	34.32	36.54	36.62	36.64	36.85	36.78	34.16

Prices

METALWORKING FACTS AND FIGURES

AVERAGE MONTHLY QUOTATIONS IN 1957

Unless otherwise noted, finished steel prices are cents per pound; semifinished steel, coke, and ammonium sulfate are dollars per net ton; other coal chemicals are in cents per unit stated; and pig iron and scrap in dollars per gross ton. All prices are mill or furnace, unless otherwise noted. December figures are subject to revision.

PITTSBURGH

PITTSBURGH	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Structural Shapes	5.00	5.00	5.00	5.00	5.00	5.00	5.22	5.275	5.275	5.275	5.275	5.275
Plates	4.85	4.85	4.85	4.85	4.85	4.85	5.05	5.10	5.10	5.10	5.10	5.10
Bars, Hot Rolled, Merchant Quality	5.075	5.075	5.075	5.075	5.075	5.075	5.355	5.425	5.425	5.425	5.425	5.425
Bars, Cold Finished	6.85	6.85	6.85	6.85	6.85	6.85	7.21	7.30	7.30	7.30	7.30	7.30
Sheets, Hot Rolled	4.675	4.675	4.675	4.675	4.675	4.675	4.875	4.925	4.925	4.925	4.925	4.925
Sheets, Cold Rolled	5.75	5.75	5.75	5.75	5.75	5.75	5.99	6.05	6.05	6.05	6.05	6.05
Sheets, Galvanized	6.30	6.30	6.30	6.30	6.30	6.30	6.54	6.60	6.60	6.60	6.60	6.60
Strip, Hot Rolled	4.675	4.675	4.675	4.675	4.675	4.675	4.875	4.925	4.925	4.925	4.925	4.925
Strip, Cold Rolled	6.85	6.85	6.85	6.85	6.85	6.85	7.09	7.15	7.15	7.15	7.15	7.15
Standard Spikes	8.775	8.775	9.225	9.225	9.225	9.225	9.645	9.75	9.75	9.75	9.75	9.75
Plain Wire	7.20	7.20	7.20	7.20	7.20	7.20	7.56	7.65	7.65	7.65	7.65	7.65
Wire Nails	8.49	8.49	8.49	8.49	8.49	8.49	8.86	8.95	8.95	8.95	8.95	8.95
Structural Rivets	10.85	11.01	11.50	11.50	11.50	11.50	12.10	12.25	12.25	12.25	12.25	12.25
Steel Pipe, Buttweld, 1-3 in.; % discount from list	20.50	18.81	18.25	18.25	18.25	18.25	15.05	14.25	14.25	14.25	14.25	14.25
Tin Plate, 1.50-lb coating (base box)	$9.95	$9.95	$9.95	$9.95	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30	$10.30
Pig Iron, Bessemer, Pittsburgh district ovens	63.50	63.50	65.50	65.50	65.50	65.50	66.40	67.00	67.00	67.00	67.00	67.00
Pig Iron, Basic, Pittsburgh district ovens	62.50	62.50	64.50	64.50	64.50	64.50	65.40	66.00	66.00	66.00	66.00	66.00
Pig Iron, No. 2 Foundry, Neville Island, Pa.	63.00	63.00	65.00	65.00	65.00	65.00	65.90	66.50	66.50	66.50	66.50	66.50
Pig Iron, Malleable, Neville Island, Pa.	63.00	63.00	65.00	65.00	65.00	65.00	65.90	66.50	66.50	66.50	66.50	66.50
Blast Furnace Silvery Pig Iron, 9.01-9.50% Si, Jackson, Ohio, furnace	79.00	79.00	83.25	83.25	83.25	83.25	83.25	83.63	84.00	84.00	84.00	84.00
Billets, Bessemer, and Open Hearth, Rerolling	74.00	74.00	74.00	74.00	74.00	74.00	76.80	77.50	77.50	77.50	77.50	77.50
Wire Rods (cents per pound)	5.80	5.80	5.80	5.80	5.80	5.80	6.08	6.15	6.15	6.15	6.15	6.15
Coke, Furnace, Beehive, spot, Connellsville, Pa.	$15.00	$15.19	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25	$15.25
Coke, Foundry, Beehive, spot, Connellsville, Pa.	18.00	18.00	18.00	18.00	18.00	18.00	18.15	18.25	18.25	18.25	18.25	18.25
Scrap, No. 1 Heavy Melting Steel	60.25	53.75	49.25	42.50	45.25	55.13	56.10	55.25	49.10	38.00	32.75	31.00
Scrap, Low Phos. (Punchings and Plate)	69.25	58.25	54.50	47.90	51.50	56.75	62.70	62.25	55.70	43.50	37.25	35.50
Scrap, No. 1 Cupola	53.75	51.00	48.75	44.50	45.50	46.50	49.10	49.50	46.10	43.50	41.50	41.00

CHICAGO

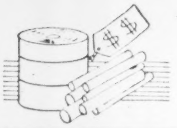
CHICAGO	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Bars, Hot Rolled, Merchant Quality	5.075	5.075	5.075	5.075	5.075	5.075	5.355	5.425	5.425	5.425	5.425	5.425
Plates	4.85	4.85	4.85	4.85	4.85	4.85	5.05	5.10	5.10	5.10	5.10	5.10
Structural Shapes	5.00	5.00	5.00	5.00	5.00	5.00	5.22	5.275	5.275	5.275	5.275	5.275
Bars, Merchant, Rail Steel	5.075	5.075	5.075	5.075	5.075	5.075	5.125	5.325	5.325	5.325	5.325	5.325
Sheets, Cold Rolled	5.75	5.75	5.75	5.75	5.75	5.75	5.99	6.05	6.05	6.05	6.05	6.05
Pig Iron, No. 2 Foundry	$63.00	$63.00	$65.00	$65.00	$65.00	$65.00	$65.90	$66.50	$66.50	$66.50	$66.50	$66.50
Pig Iron, Malleable	63.00	63.00	65.00	65.00	65.00	65.00	65.90	66.50	66.50	66.50	66.50	66.50
Oven Foundry Coke, delivered from St. Paul	33.14	33.14	33.14	33.14	33.14	33.14	32.22	33.24	33.24	33.24	33.24	33.24
Scrap, No. 1 Heavy Melting Steel	57.13	48.88	45.88	40.50	41.25	52.75	53.30	53.00	48.40	36.75	32.50	31.50
Scrap, Rails for Rerolling	77.75	65.88	59.88	55.90	57.75	69.50	77.30	75.50	64.10	53.75	47.88	46.00
Scrap, No. 1 Cupola Cast	49.50	45.75	43.00	39.50	41.25	47.25	47.50	46.75	43.10	37.00	35.50	35.00

EASTERN PENNSYLVANIA

EASTERN PENNSYLVANIA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Plates, Sparrows Point, Md.	4.85	4.85	4.85	4.85	4.85	4.85	5.05	5.10	5.10	5.10	5.10	5.10
Structural Shapes, deld. Philadelphia	5.31	5.31	5.31	5.31	5.31	5.31	5.482	5.530	5.545	5.545	5.545	5.545
Steel Bars, deld. Philadelphia	5.365	5.365	5.365	5.365	5.365	5.365	5.645	5.718	5.725	5.725	5.725	5.725
Sheets, Hot Rolled, Sparrows Point, Md.	4.675	4.675	4.675	4.675	4.675	4.675	4.875	4.925	4.925	4.925	4.925	4.925
Pig Iron, Basic, deld. Philadelphia	$62.26	$62.26	$68.38	$68.38	$68.38	$68.38	$69.28	$69.88	$70.01	$70.01	$70.01	$70.01
Pig Iron, No. 2 Foundry, deld. Philadelphia	66.76	66.76	68.88	68.88	68.88	68.88	69.78	70.38	70.51	70.51	70.51	70.51
Pig Iron, Standard Low Phos, deld. Philadelphia	78.26	78.26	80.26	80.26	80.26	80.26	81.16	81.76	82.27	82.27	82.27	82.27
Oven Foundry Coke, Kearny, N. J.	29.75	30.00	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75	29.75
Scrap, No. 1 Heavy Melting Steel	59.50	57.63	53.75	47.70	50.75	56.50	54.60	51.75	45.70	37.63	33.75	32.00
Scrap, No. 1 Cupola Cast	55.00	52.75	49.38	43.90	44.50	46.75	48.40	47.00	45.90	42.50	39.50	39.00
Spiegeleisen, 19-21%, Palmerton, Pa., furnace	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50	102.50

COAL CHEMICALS

COAL CHEMICALS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Benzene, per gallon, producers' plants, tank lots	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Toluene, 1 degree, per gallon, producers' plants	33.00	33.00	33.00	33.00	33.00	33.00	33.00	31.25	29.50	29.50	29.50	29.50
Xylene, per gallon, producers' plants, tank lots	33.50	33.50	33.50	33.50	33.50	33.50	33.50	33.25	33.00	33.00	33.00	33.00
Phenol, Grade 5, per pound, producers' plants	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50	16.50
Ammonium Sulfate, per ton, bulk, ovens	32.00	32.00	32.00	32.00	32.00	32.00	33.00	33.00	33.00	33.00	33.00	33.00



Nonferrous Prices

METALWORKING FACTS AND FIGURES

NONFERROUS METAL PRICES

(Cents per pound)

	1957												Yearly Averages		
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.*	1957*	1956	1955
Copper Sheets[1]	58.13	55.13	54.13	54.13	54.13	53.44	51.38	50.82	49.43	49.13	50.13	50.13	52.51	63.52	56.60
Copper Rods[8]	55.36	52.36	51.36	51.36	51.36	50.67	48.61	48.05	46.66	46.36	47.36	47.36	49.74	60.68	54.00
Copper Tubing[1]	58.32	55.32	54.32	54.32	54.32	53.63	51.57	51.01	49.62	49.32	50.32	50.32	52.70	63.64	56.67
Yellow Brass Sheets[1]	50.19	48.19	47.52	47.52	47.06	46.31	44.69	44.19	43.22	43.02	44.02	44.02	45.83	53.22	47.70
Yellow Brass Rods[1]	40.17	38.31	37.69	37.69	35.70	34.45	32.87	32.39	31.49	31.30	32.30	32.30	34.72	43.50	38.45
Yellow Brass Tubing[1]	53.10	51.10	50.43	50.43	49.97	49.22	47.60	47.10	46.13	45.93	46.93	46.93	48.74	56.12	50.61
Nickel Silver Sheets[3]	66.66	64.71	64.06	64.06	63.72	63.05	61.52	60.69	59.63	59.43	60.43	60.43	62.37	68.01	61.53
Phosphor Bronze Sheets[4]	77.25	74.20	73.17	73.17	73.17	72.50	70.47	69.83	68.38	68.07	69.07	69.07	71.53	81.60	74.85
Zinc Sheets[1]	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	23.86	23.00
Bronze Sheets[2]	56.23	53.53	52.63	52.63	52.49	51.79	49.86	49.31	48.05	47.78	48.78	48.78	50.99	60.71	54.46
Bronze Rods[2]	56.17	53.47	52.57	52.57	52.46	51.77	49.80	49.25	47.99	47.72	48.72	48.72	50.93	60.65	54.40
Bronze Tubing[2]	58.79	56.09	55.19	55.19	55.08	54.39	52.42	51.87	50.61	50.34	51.34	51.34	53.55	63.19	57.02
Yellow Brass Wire[1]	50.73	48.73	48.06	48.06	47.60	46.85	45.23	44.73	43.76	43.56	44.56	44.56	46.37	53.75	48.24
Copper Magnet Wire[5]	48.68	45.68	44.68	44.68	44.68	43.94	41.93	41.93	40.73	40.43	40.43	40.43	43.19	54.72	49.84
Weatherproof Copper Wire[6]	40.78	38.53	37.78	37.78	37.78	37.27	35.72	35.30	33.96	33.66	33.66	33.66	36.32	45.35	42.48
Bare Copper Wire[6]	41.355	38.355	37.355	37.355	37.355	36.668	34.605	34.043	32.655	32.355	32.355	32.355	35.568	47.48	43.21
No. 115 Brass Ingot[7]	34.75	32.00	31.50	31.50	31.00	30.25	29.50	29.31	27.65	27.00	27.13	27.25	29.90	38.68	37.25
No. 305 Brass Ingot[7]	38.25	35.88	33.50	33.50	35.00	34.25	33.50	33.31	31.45	31.00	33.63	31.25	33.71	42.19	40.95
No. 405 Brass Ingot[7]	27.25	25.75	25.50	25.25	25.13	24.75	24.00	23.88	22.30	22.13	22.56	22.75	24.27	30.93	31.14

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*Estimated.

[1] F.o.b. mill. [2] 90% Cu, f.o.b. mill. [3] 10% Ni, f.o.b. mill. [4] Grade A, f.o.b. mill. [5] Car lots, f.o.b. destination. [6] Car lots, f.o.b. eastern mill. [7] Delivered.
[8] Cold-drawn, f.o.b. mill.

COPPER

Electrolytic; cents per lb, delivered
Connecticut Valley

	1957	1956	1955	Yearly Averages
Jan.	35.433	46.700	30.180	1957*.29.600
Feb.	32.863	48.076	33.000	1956..42.446
Mar.	31.462	49.727	33.222	1955..38.217
Apr.	31.598	47.500	36.000	1954..29.777
May	31.087	45.096	36.000	1953..29.037
June	30.250	43.000	36.000	1952..24.500
July	28.822	40.030	36.000	1951..24.500
Aug.	28.639	39.750	37.759	1950..21.588
Sept.	26.469	39.500	45.380	1949..19.499
Oct.	26.361	38.365	44.594	1948..22.317
Nov.	26.217	35.956	44.420	1947..21.215
Dec.	26.000*	35.650	46.053	1946..14.043

ZINC

Prime Western; cents per lb, East St. Louis

	1957	1956	1955	Yearly Averages
Jan.	13.500	13.440	11.500	1957*.11.397
Feb.	13.500	13.500	11.500	1956..13.495
Mar.	13.500	13.500	11.500	1955..12.303
Apr.	13.500	13.500	11.927	1954..10.721
May	11.923	13.500	12.000	1953..10.851
June	10.840	13.500	12.250	1952..16.213
July	10.000	13.500	12.500	1951..17.994
Aug.	10.000	13.500	12.500	1950..13.879
Sept.	10.000	13.500	12.940	1949..12.152
Oct.	10.000	13.500	13.020	1948..13.563
Nov.	10.000	13.500	13.000	1947..10.500
Dec.	10.000*	13.500	13.000	1946.. 8.727

CADMIUM

Regular shapes; dollars per lb, deld.

	1957	1956	1955	1954	1953	1952
Jan.	1.70	1.70	1.70	2.00	1.94	2.55
Feb.	1.70	1.70	1.70	1.70	2.00	2.55
Mar.	1.70	1.70	1.70	1.70	2.00	2.55
Apr.	1.70	1.70	1.70	1.70	2.00	2.55
May	1.70	1.70	1.70	1.70	2.00	2.40
June	1.70	1.70	1.70	1.70	2.00	2.25
July	1.70	1.70	1.70	1.70	2.00	2.20
Aug.	1.70	1.70	1.70	1.70	2.00	2.00
Sept.	1.70	1.70	1.70	1.70	2.00	2.00
Oct.	1.70	1.70	1.70	1.70	2.00	2.00
Nov.	1.70	1.70	1.70	1.70	2.00	2.00
Dec.	1.70*	1.70	1.70	1.70	2.00	1.80
Avg	1.70*	1.70	1.70	1.72	1.99	2.24

ANTIMONY

Domestic, bulk, 99.5% car lots; cents per lb,
f.o.b. Laredo, Tex.

	1957	1956	1955	Yearly Averages
Jan.	33.000	33.000	28.500	1957*.33.000
Feb.	33.000	33.000	28.500	1956..33.000
Mar.	33.000	33.000	28.500	1955..30.150
Apr.	33.000	33.000	28.500	1954..28.500
May	33.000	33.000	28.500	1953..33.932
June	33.000	33.000	28.500	1952..42.112
July	33.000	33.000	28.500	1951..42.335
Aug.	33.000	33.000	30.300	1950..27.626
Sept.	33.000	33.000	33.000	1949..36.875
Oct.	33.000	33.000	33.000	1948..35.010
Nov.	33.000	33.000	33.000	1947..31.922
Dec.	33.000*	33.000	33.000	1946..15.972

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*Estimated.

ALUMINUM

99.5% primary pig; cents per lb. f.o.b.
shipping point

	1957	1956	1955	Yearly Averages
Jan.	25.00	22.50	21.11	1957*. 25.42
Feb.	25.00	22.50	21.50	1956.. 24.03
Mar.	25.00	22.64	21.50	1955.. 21.88
Apr.	25.00	24.00	21.50	1954.. 20.20
May	25.00	24.00	21.50	1953.. 19.70
June	25.00	24.00	21.50	1952.. 18.40
July	25.00	24.00	21.50	1951.. 18.00
Aug.	26.00	24.70	22.50	1950.. 16.70
Sept.	26.00	25.00	22.50	1949.. 16.00
Oct.	26.00	25.00	22.50	1948.. 14.73
Nov.	26.00	25.00	22.50	1947.. 14.00
Dec.	26.00*	25.00	22.50	1946.. 14.00

LEAD

Common grade; cents per lb. St. Louis

	1957	1956	1955	Yearly Averages
Jan.	15.800	15.960	14.800	1957*.14.459
Feb.	15.800	15.800	14.800	1956..15.813
Mar.	15.800	15.800	14.800	1955..14.940
Apr.	15.800	15.800	14.800	1954..13.854
May	15.185	15.800	14.800	1953..13.283
June	14.120	15.800	14.800	1952..16.268
July	13.800	15.800	14.800	1951..17.294
Aug.	13.800	15.800	14.800	1950..13.095
Sept.	13.800	15.800	14.920	1949..15.191
Oct.	13.504	15.800	15.300	1948..17.867
Nov.	13.300	15.800	15.300	1947..14.504
Dec.	12.800*	15.800	15.358	1946.. 7.957

COBALT

97-99%; dollars per lb for 550 lb keg

	1957	1956	1955	1954	1953	1952
Jan.	2.54	2.60	2.60	2.60	2.40	2.40
Feb.	2.35	2.60	2.60	2.60	2.40	2.40
Mar.	2.35	2.60	2.60	2.60	2.40	2.40
Apr.	2.35	2.60	2.60	2.60	2.40	2.40
May	2.26	2.60	2.60	2.60	2.40	2.40
June	2.00	2.60	2.60	2.60	2.40	2.40
July	2.00	2.60	2.60	2.60	2.40	2.40
Aug.	2.00	2.60	2.60	2.60	2.40	2.40
Sept.	2.00	2.60	2.60	2.60	2.40	2.40
Oct.	2.00	2.60	2.60	2.60	2.40	2.40
Nov.	2.00	2.60	2.60	2.60	2.60	2.40
Dec.	2.00*	2.60	2.60	2.60	2.60	2.40
Avg	2.15*	2.60	2.60	2.60	2.43	2.40

SILVER

Open market, cents per fine oz., New York

	1957	1956	1955	Yearly Averages
Jan.	91.375	90.381	85.250	1957*.90.846
Feb.	91.375	91.043	85.250	1956..90.839
Mar.	91.375	91.148	86.880	1955..89.062
Apr.	91.375	90.880	87.000	1954..85.250
May	91.375	90.750	88.882	1953†.85.188
June	90.500	90.461	89.688	1952†.84.941
July	90.250	90.135	90.438	1951†.89.368
Aug.	90.938	90.588	90.750	1950†.74.165
Sept.	90.625	90.750	90.795	1949†.71.930
Oct.	90.625	91.178	91.800	1948†.74.361
Nov.	90.344	91.375	91.500	1947†.71.820
Dec.	90.000*	91.375	90.510	1946†.80.151

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*Estimated.

†As reported by Handy & Harman, New York.

NICKEL

Electrolytic cathodes, 99.5%, base sizes,
unpacked, cents per lb, f.o.b. refinery

	1957	1956	1955	Yearly Averages
Jan.	74.000	64.500	64.500	1957*.74.000
Feb.	74.000	64.500	64.500	1956..65.032
Mar.	74.000	64.500	64.500	1955..64.500
Apr.	74.000	64.500	64.500	1954..60.450
May	74.000	64.500	64.500	1953..59.888
June	74.000	64.500	64.500	1952..56.500
July	74.000	64.500	64.500	1951..54.000
Aug.	74.000	64.500	64.500	1950..44.809
Sept.	74.000	64.500	64.500	1949..40.000
Oct.	74.000	64.500	64.500	1948..36.528
Nov.	74.000	64.500	64.500	1947..35.000
Dec.	74.000*	70.880	64.500	1946..31.850

TIN

Straits, spot; cents per lb, New York

	1957	1956	1955	Yearly Averages
Jan.	101.480	105.067	87.280	1957*.96.200
Feb.	101.159	100.908	90.908	1956.101.517
Mar.	99.683	100.606	91.176	1955..94.939
Apr.	99.276	99.270	91.458	1954..91.936
May	98.341	97.024	91.410	1953..95.925
June	98.080	94.611	93.668	1952.120.492
July	96.576	96.435	97.045	1951.127.072
Aug.	94.259	99.043	96.519	1950..95.552
Sept.	93.422	103.745	96.565	1949..99.996
Oct.	91.843	105.981	96.230	1948..99.250
Nov.	89.288	111.049	97.825	1947..77.975
Dec.	91.000*	104.465	107.980	1946..54.536

IRIDIUM

Dollars per troy ounce

	1957	1956	1955	1954	1953
Jan.	100.00	110.00	115.00	170.00	180.00
Feb.	105.00	106.25	121.50	170.00	180.00
Mar.	105.00	105.00	105.00	156.50	180.00
Apr.	105.00	105.00	105.00	147.50	177.50
May	105.00	105.00	103.00	147.50	170.00
June	103.75	105.00	95.00	147.50	170.00
July	100.00	105.00	95.00	147.50	170.00
Aug.	105.00	100.00	97.00	147.50	170.00
Sept.	99.40	100.00	100.00	147.50	170.00
Oct.	98.00	100.00	102.00	147.50	170.00
Nov.	95.75	100.00	110.00	147.50	170.00
Dec.	95.00*	104.00	110.00	123.12	170.00
Avg	101.40*	103.77	104.88	149.97	173.13

PLATINUM

Dollars per ounce

	1957	1956	1955	1954	1953	1952
Jan.	102.00	106.50	82.13	92.00	91.50	91.50
Feb.	98.75	104.50	81.00	92.00	91.50	91.50
Mar.	93.50	104.00	78.00	87.90	91.50	91.50
Apr.	93.50	103.90	78.00	85.50	91.50	91.50
May	93.13	105.75	77.90	85.50	91.50	100.50
June	92.25	106.50	78.13	85.50	91.50	94.50
July	90.70	106.50	81.38	85.50	93.00	91.50
Aug.	84.75	106.50	83.50	83.50	92.00	91.50
Sept.	84.00	106.00	90.63	85.50	92.00	91.50
Oct.	84.00	105.50	94.30	85.50	92.00	91.50
Nov.	84.00	105.50	102.75	85.50	92.00	91.50
Dec.	79.28*	104.60	107.00	101.00	92.00	91.50
Avg	89.99*	105.48	86.23	86.60	91.83	92.50

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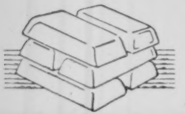
*Estimated.



COPPER PRODUCTION, SHIPMENTS & STOCKS

DOMESTIC STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries to Customers	Refined Stocks End of Period
1957					
10 Mo.	930,761	95,135	1,349,554	1,083,458(a)	166,976
Jan.	94,873	14,683	139,150	119,925(a)	118,564
Feb.	92,508	8,941	134,291	101,565	136,502
Mar.	96,363	10,355	143,961	113,571	140,191
Apr.	98,910	11,160	144,013	116,716	139,842
May	96,334	9,618	151,045	120,336	155,365
June	95,893	8,792	134,270	101,993	165,549
July	86,141	6,386	127,434	84,702	191,515
Aug.	89,680	9,246	128,480	107,522	192,931
Sept.	87,270	6,925	117,078	102,925	176,813
Oct.	92,789	9,029	129,832	114,203	166,976
1956	1,133,134	139,584	1,580,387	1,465,999(a)	120,645
1955	1,036,702	124,760	1,467,448	1,446,354(a)	61,554
1954	863,721	102,472	1,311,031	1,208,755(a)	47,108
1953	957,318	110,475	1,395,003	1,443,719(a)	89,193
1952	961,886	46,003	1,189,112	1,445,834(a)	58,858
1951	964,589	56,910	1,199,784	1,367,787	71,528
1950	940,249	117,439	1,270,768	1,371,464	49,040
1949	772,986	135,052	1,056,463	1,031,595	116,027
1948	850,088	130,410	1,233,697	1,344,445	96,080
1947	871,391	105,307	1,196,393	1,383,666	76,035

FOREIGN STATISTICS—Net Tons

Period	PRODUCTION Primary	Secondary	Refined	Deliveries to Customers	Refined Stocks End of Period
1957					
10 Mo.	1,467,692	9,958	1,160,491	1,293,910	261,015
Jan.	146,097	831	117,579	143,089	226,408
Feb.	143,171	1,636	108,661	113,231	233,626
Mar.	148,044	1,495	120,688	149,700	229,065
Apr.	135,999	1,209	108,844	136,579	223,621
May	153,230	838	124,283	136,043	221,396
June	156,356	879	117,531	118,059	234,745
July	138,183	1,017	111,951	119,231	238,908
Aug.	137,211	719	103,189	123,778	231,681
Sept.	147,711	637	110,659	122,113	242,116
Oct.	161,690	697	137,106	132,087	261,015
1956	1,729,705	12,952	1,406,773	1,366,979	233,775
1955	1,576,960	8,305	1,260,861	1,298,037	159,777
1954	1,494,386	5,273	1,155,516	1,247,120	181,529
1953	1,441,874	13,238	1,120,066	831,441	280,530

Total Domestic & Foreign

Period	Primary	Secondary	Refined	Deliveries to Customers	Refined Stocks End of Period
1957					
10 Mo.	2,398,453	105,093	2,510,045	2,377,368	427,991
1956	2,862,839	152,536	2,987,160	2,832,978	354,420
1955	2,613,662	133,065	2,728,309	2,744,391	221,331
1954	2,358,107	107,745	2,466,547	2,455,875	228,637
1953	2,399,192	123,713	2,515,069	2,275,160	369,723

Copper Institute. (a)—Includes tonnages delivered from government stocks and by importers.

Imports of Copper

Unrefined, Scrap, Refined—Net Tons

	1957	1956	1955	1954	1953	1952
Jan.	58,502	32,195	39,307	34,790	50,055	49,580
Feb.	43,088	48,674	46,082	55,868	62,345	41,941
Mar.	55,338	44,170	45,273	43,384	52,387	48,272
Apr.	58,292	47,881	44,027	45,975	70,191	42,970
May	48,377	52,446	45,340	51,989	67,662	37,172
June	40,963	52,992	49,368	81,833	80,943	33,061
July	53,605	49,324	46,581	62,228	66,200	66,380
Aug.	47,898	58,091	55,089	55,391	48,305	61,122
Sept.	.....	47,882	63,663	54,436	57,379	67,817
Oct.	.....	63,686	52,500	30,805	50,810	59,910
Nov.	.....	41,652	57,114	43,540	32,226	59,230
Dec.	.....	60,226	58,050	46,755	32,105	70,300
Monthly Avg	.....	49,935	50,200	50,583	55,884	53,146

U. S. Bureau of the Census.

Exports of Copper

Refined, Scrap, Brass, and Bronze Ingots—Net Tons

	1957	1956	1955	1954	1953	1952
Jan.	43,298	18,554	26,929	30,472	8,079	10,598
Feb.	40,981	21,659	37,375	25,499	6,030	12,842
Mar.	57,151	21,686	25,673	19,043	8,645	15,303
Apr.	50,077	18,040	27,095	31,235	6,551	19,494
May	44,775	30,303	30,233	29,712	8,669	20,252
June	47,268	17,703	19,323	26,046	7,278	18,347
July	34,519	16,172	13,819	24,183	13,317	15,435
Aug.	28,135	24,047	15,399	27,121	18,064	14,604
Sept.	.....	27,556	22,294	16,783	18,249	20,945
Oct.	.....	29,312	20,405	25,867	18,870	18,226
Nov.	.....	25,165	19,340	18,883	15,898	13,016
Dec.	.....	49,408	19,142	23,562	20,416	16,257
Monthly Avg	.....	24,967	23,086	24,866	12,506	16,277

U. S. Bureau of the Census.

Brass Ingot Shipments

Net Tons

	1957	1956	1955	1954
Jan.	25,681	27,736	25,201	20,661
Feb.	20,769	24,949	25,349	19,920
Mar.	21,948	28,310	29,713	23,653
Apr.	23,507	25,808	27,641	24,746
May	22,037	23,437	23,708	22,269
June	18,888	18,842	23,141	22,348
July	16,695	17,364	18,513	17,074
Aug.	19,654	23,812	27,013	21,684
Sept.	19,670	20,929	26,349	22,464
Oct.	22,800	23,045	25,228	24,080
Nov.	.....	21,818	25,102	23,061
Dec.	.....	18,046	21,448	21,273
Totals	.....	274,096	298,406	263,233

Compiled by Ingot Brass & Bronze Industry, representing in excess of 95 per cent of brass and bronze industry.

Copper Consumption in U. S.

Refined Metal—Net Tons

	1956	1955	1954
Brass Mills	611,098	647,044	545,645
Wire Mills	864,585	812,663	668,601
Chemical Plants	1,758	1,744	2,329
Secondary Smelters	7,654	6,827	7,434
Foundries & Misc.	36,294	33,726	30,720
Totals	1,521,389	1,502,004	1,254,729

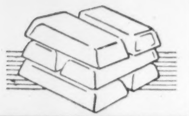
U. S. Bureau of Mines.

Copper & Brass Mill Fabricator Statistics

(They cover U. S., duty free, and duty paid foreign copper until January, 1947; from that date all sources are included. Figures are in net tons.)

	DELIVERIES		STOCKS AT END OF PERIOD					
	Deliveries to Users (actual consump.)	Producer Deliveries to Fabricators	Fabricators' Refined Stocks	Less Working Stocks	Visible Supplies	Plus Undelivered Purchases	Total Stocks and Purchases	Unfilled Orders
1957								
10 Mo.	1,097,310	1,083,473	420,130	341,869	78,261	80,774	159,035	138,420
Jan.	119,517	119,925	435,635	335,944	99,691	107,231	206,922	178,326
Feb.	114,298	101,565	422,266	334,542	87,724	110,174	197,898	178,913
Mar.	106,170	113,571	429,410	338,454	90,956	104,551	195,507	164,623
Apr.	117,041	116,716	429,708	335,921	93,787	98,638	192,425	164,410
May	115,355	120,351	434,852	336,697	98,155	92,943	191,098	170,476
June	110,527	101,993	426,905	340,743	86,162	82,919	169,081	153,042
July	77,991	84,702	432,918	341,684	91,234	85,728	176,962	144,410
Aug.	110,323	107,522	429,627	344,315	85,312	82,768	168,080	144,375
Sept.	106,927	102,925	425,168	344,530	80,638	80,436	161,074	144,538
Oct.	119,161	114,203	420,130	341,869	78,261	80,774	159,035	138,420
1956	1,416,378	1,465,999	437,187	336,217	100,970	117,601	218,571	183,834
Jan.	138,600	130,431	376,753	312,128	64,625	143,815	208,440	305,942
Feb.	130,973	139,433	388,823	319,279	69,544	135,637	205,181	282,314
Mar.	133,609	139,453	392,143	319,056	73,087	140,348	213,435	291,465
Apr.	121,961	143,049	413,979	319,247	94,732	135,071	229,803	266,239
May	124,727	143,061	435,083	318,592	116,491	131,023	247,514	249,352
June	113,835	131,299	451,126	324,970	126,156	114,223	240,379	227,097
July	81,275	97,698	465,015	334,584	130,421	109,040	239,461	220,810
Aug.	117,427	109,618	457,679	338,818	118,861	115,295	234,156	221,975
Sept.	115,867	104,486	445,679	338,488	107,191	114,981	222,172	204,154
Oct.	119,440	113,353	440,706	336,856	103,850	112,893	216,743	198,517
Nov.	119,441	114,524	435,216	335,829	99,387	110,792	210,179	178,814
Dec.	99,223	99,594	437,187	336,217	100,970	117,601	218,571	183,834
1955	1,418,241	1,446,354	389,974	314,145	75,829	139,094	214,923	293,264
1954	1,231,840	1,208,755	360,526	304,619	55,907	58,125	114,032	136,581
1953	1,375,869	1,443,719	380,881	309,664	71,217	25,022	96,239	170,917
1952	1,391,477	1,445,834	331,499	292,157	39,342	32,652	71,994	275,608
1951	1,394,960	1,367,787	280,402	295,385	—14,983	32,147	17,164	303,050
1950	1,438,237	1,371,464	290,241	288,392	1,849	92,372	94,221	313,052
1949	1,053,225	1,031,595	354,992	285,298	69,694	82,793	152,487	189,407
1948	1,394,307	1,344,445	379,346	295,958	83,388	81,496	164,884	315,944
1947	1,338,383	1,383,666	423,432	293,859	129,573	103,765	233,338	338,260
1946	1,231,225	1,260,921	411,013	286,418	124,595	59,421	184,016	526,648
1945	1,462,440	1,517,842	375,618	268,490	107,128	44,100	151,228	362,436

Copper Institute.



Nonferrous Metals

METALWORKING FACTS AND FIGURES

Slab Zinc

Net Tons

Commencing with January, 1948, all regularly operating U. S. primary and secondary smelters are included. Production from foreign ores is included, commencing with 1940.

	Stock Beginning	Production	SHIPMENTS Domestic	Export & Drawback	Gov't. Acc't.	Total	Unfilled Orders at End
1957*	68,622	1,051,400	775,000	15,000	181,200	971,200	21,000
Jan.	68,622	93,452	67,273	450	15,377	83,100	42,922
Feb.	78,974	88,078	67,731	1,527	10,905	80,163	56,421
Mar.	87,040	96,924	67,441	1,558	25,608	94,607	56,818
Apr.	89,357	96,506	55,000	1,411	23,921	80,332	42,102
May	105,531	96,855	60,729	2,106	26,858	89,693	31,539
June	112,693	90,719	54,275	1,358	14,324	69,957	28,822
July	133,455	85,779	57,862	4,007	11,186	73,055	28,296
Aug.	146,179	84,166	70,318	860	9,871	81,049	30,890
Sept.	149,296	77,455	62,111	530	10,344	72,985	32,379
Oct.	153,766	81,492	66,225	372	12,736	79,333	31,466
Nov.	155,925	79,754	73,419	581	9,148	83,148	21,867
1956	40,979	1,062,954	869,270	9,027	157,014	1,035,311	34,913
1955	124,277	1,031,018	1,007,619	19,496	87,200	1,114,316	72,908
1954	180,843	868,242	787,922	27,929	108,957	924,808	45,862
1953	87,160	971,191	818,850	16,326	42,332	877,508	35,466
1952	21,901	961,430	803,343	56,202	36,626	896,171	45,264
1951	8,884	931,833	836,800	42,067	39,949	918,816	50,909
1950	94,221	910,363	849,255	18,189	128,256	995,700	74,795
1949	20,848	870,113	648,285	56,929	91,526	796,740	42,625
1948	68,647	850,105	770,396	69,910	57,598	897,904	51,318
1947	175,800	848,027	698,281	117,305	140,230	955,816	59,705
1946	259,391	759,346	714,292	66,638	62,007	842,937	58,057
1945	237,520	799,520	762,925	9,422	5,302	777,649	27,092
1944	173,510	901,332	830,334	6,988	......	837,322	21,332
1943	89,275	971,873	831,430	56,208	......	887,638	44,914
1942	24,066	929,770	733,918	151,650	......	885,568	52,752
1941	17,582	863,955	751,276	106,195	......	857,471	87,666
1940	74,262	706,100	674,615	88,165	......	762,780	125,132
1939	126,769	538,198	598,972	......	......	598,972	53,751
1938	65,333	456,990	395,534	20	......	395,554	40,829
1937	44,955	589,619	569,241	......	......	569,241	48,339

American Zinc Institute Inc.

*Estimated.

U. S. Lead

Refiners' Stocks, Production, Shipments

Net Tons

	Stock at Beginning	Production (Inc. Secondary)	Total Supply	Domestic Shipments
1957*	41,181	600,000	641,181	480,000
Jan.	41,181	50,854	92,035	40,549
Feb.	42,905	48,012	90,917	37,517
Mar.	48,699	52,357	101,056	38,225
Apr.	46,184	56,170	102,354	37,583
May	57,444	51,718	109,162	35,334
June	58,085	48,203	106,288	37,257
July	64,861	47,100	111,961	38,582
Aug.	68,009	48,191	116,200	49,406
Sept.	60,633	50,436	111,069	51,859
Oct.	54,682	52,041	106,723	40,447
1956	41,181	613,293	644,382	524,848
1955	92,719	547,153	639,872	531,339
1954	81,152	551,618	632,770	475,552
1953	43,560	533,883	577,443	488,437
1952	25,339	532,778	558,117	492,094
1951	35,619	486,874	522,493	496,184
1950	70,424	571,763	642,187	499,637
1949	38,644	542,676	581,320	355,905
1948	21,328	511,356	532,684	490,630
1947	47,587	541,065	588,652	566,666
1946	44,867	396,688	441,555	393,904
1945	19,536	524,328	543,864	500,003
1944	33,090	538,618	571,708	552,063
1943	34,937	546,673	581,610	548,417
1942	20,185	633,818	654,003	618,947
1941	40,926	634,888	675,814	655,542
1940	58,777	685,480	644,257	603,143
1939	115,902	497,991	613,893	555,074
1938	129,131	408,539	537,570	421,625
1937	171,856	533,215	705,071	575,933
1936	222,306	463,006	685,312	513,361
1935	234,030	421,764	655,794	433,456

American Bureau of Metal Statistics.

*Estimated.

Mine Production of Zinc

Net Tons

	1957	1956	1955	1954	1953
Jan.	49,186	41,082	41,005	36,637	53,002
Feb.	45,847	42,703	40,101	39,398	49,356
Mar.	50,420	47,745	46,286	42,248	51,680
Apr.	50,755	44,971	43,721	39,915	51,103
May	46,060	47,286	45,351	40,008	47,790
June	44,521	45,141	43,972	40,391	46,365
July	41,849	43,152	41,854	38,445	42,305
Aug.	41,319	45,532	43,555	38,141	40,965
Sept.	33,688	42,513	43,080	34,178	39,188
Oct.	...	49,600	42,700	35,511	38,771
Nov.	...	46,170	41,083	38,338	36,460
Dec.	...	46,445	41,963	39,035	37,745
Mo. Avg	...	45,195	42,889	38,770	44,561

U. S. Bureau of Mines.

Mine Production of Lead

Net Tons

	1957	1956	1955	1954	1953
Jan.	30,229	26,822	27,828	24,946	30,633
Feb.	29,136	28,250	27,427	27,624	29,427
Mar.	30,865	30,950	31,315	29,531	31,347
Apr.	30,915	29,705	28,686	26,900	31,052
May	29,855	29,975	28,932	25,401	29,045
June	26,717	29,481	28,427	26,253	28,349
July	26,994	27,969	25,783	25,364	26,364
Aug.	27,496	30,630	26,813	27,066	26,083
Sept.	24,359	27,415	26,876	25,001	26,474
Oct.	...	31,520	27,564	25,755	26,652
Nov.	...	28,503	25,975	26,911	24,671
Dec.	...	27,109	27,802	28,230	27,107
Mo. Avg	...	29,402	28,169	26,499	28,100

U. S. Bureau of Mines.

Titanium

Domestic Production—Net Tons

	Sponge		Mill Products
1957*	18,600	1957*	5,700
1956	14,595	1956	5,165
1955	7,398	1955	1,893
1954	5,370	1954	1,250
1953	2,241	1953	1,150
1952	1,075	1952	250
1951	495	1951	75
1950	75	1950	55

U. S. Bureau of Mines. STEEL.

*Estimated.

CONSUMPTION OF SLAB ZINC IN U. S.

Net Tons

	Galvanizing	Brass & Bronze Products	Rolled Zinc	Zinc-Base Alloys	Miscellaneous	Total
1957						
Jan.	34,337	10,800	3,502	36,517	4,334	90,490
Feb.	31,686	9,156	3,284	32,520	4,106	80,752
Mar.	30,747	8,860	3,553	30,946	4,278	78,384
Apr.	30,631	9,491	4,001	29,166	4,200	77,489
May	30,537	9,563	3,389	28,423	3,997	75,909
June	29,907	8,710	3,613	27,688	3,546	73,464
July	26,067	6,361	2,698	26,116	3,881	65,123
Aug.	27,885	9,755	3,686	29,237	3,999	74,562
1956	421,218	122,395	45,382	352,451	46,651	988,097
1955	439,697	144,816	50,363	404,790	45,002	1,084,668
1954	398,599	107,293	45,979	286,817	37,442	876,130
1953	377,688	155,608	51,318	236,689	31,480	852,783
1952	375,563	155,311	51,508	236,022	30,885	849,289

CONSUMPTION OF LEAD IN U. S.—1956-57

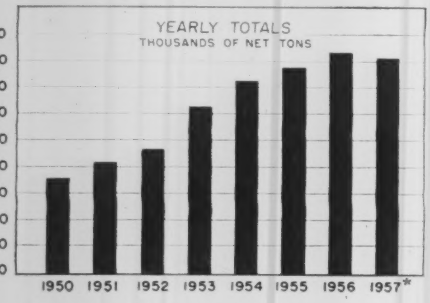
Net Tons

Metal Products	Total 1956	1957 Jan.	Feb.	Mar.	Apr.	May	June	July
Ammunition	44,238	3,022	3,134	3,794	4,089	4,626	3,697	3,343
Bearing Metals	27,828	2,425	2,028	1,989	2,054	1,877	1,927	1,824
Brass & Bronze	26,351	2,659	1,827	1,930	1,978	1,955	1,865	1,562
Cable Covering	133,924	10,761	10,438	11,090	11,324	10,273	9,935	7,071
Calking Lead	60,487	5,334	3,890	4,786	5,901	5,315	6,718	4,776
Casting Metals	11,304	986	818	1,193	1,187	1,279	999	987
Collapsible Tubes	10,155	831	615	801	854	719	843	519
Foil	4,552	343	279	540	478	410	246	319
Pipe, Traps & Bends	26,777	1,964	1,850	1,988	1,966	1,951	1,806	2,013
Sheet Lead	29,674	2,215	2,303	2,165	2,085	1,908	2,339	2,110
Solder	72,015	6,435	6,243	5,940	5,538	5,438	5,978	5,868
Storage Batteries:								
Antimonial Lead	185,171	16,528	16,499	15,638	13,666	15,862	11,904	13,056
Oxides	180,960	17,637	16,306	14,959	13,972	13,371	12,138	13,189
Terne Metal	1,719	136	78	170	49	98	116	64
Type Metal	23,576	2,133	2,079	2,343	2,102	1,995	2,062	1,978
Total Metal Products	838,731	73,409	68,387	69,326	67,243	67,077	62,573	58,679
Pigments	115,225	9,287	9,334	9,964	9,615	9,596	10,030	7,888
Chemicals	194,712	15,177	13,527	14,600	14,567	13,968	14,713	14,737
Miscellaneous Uses†	41,305	3,564	3,161	3,480	3,450	3,350	3,478	2,904
Total Consumed†	1,190,000	101,400	94,400	97,400	94,900	94,000	90,800	84,200

U. S. Bureau of Mines.

†Partly estimated.

PRIMARY ALUMINUM PRODUCTION



Net Tons

	1957	1956	1955	1954	1953	1952	1951
Jan.	147,029	140,394	128,203	116,247	89,895	76,934	67,954
Feb.	119,059	132,763	116,236	110,483	92,649	72,374	62,740
Mar.	135,706	145,895	130,272	122,339	104,460	77,069	70,022
Apr.	139,152	144,726	126,394	120,434	102,071	76,880	67,701
May	145,174	150,800	131,128	125,138	105,464	80,803	67,721
June	138,007	145,726	127,634	120,758	104,152	77,476	67,453
July	142,041	151,624	132,669	126,161	109,285	78,368	72,698
Aug.	143,449	92,406	133,551	125,296	110,545	85,175	73,815
Sept.	129,277	132,316	130,606	120,332	109,333	76,882	69,429
Oct.	133,759	149,125	134,655	125,089	108,219	77,312	72,647
Nov.	......	145,081	133,689	121,252	105,636	74,639	72,274
Dec.	......	148,391	140,748	127,035	110,291	83,409	72,454
Totals ..	1,630,000*	1,679,247	1,565,785	1,460,564	1,252,000	937,321	836,908

Yearly totals reflect adjustments and in some instances vary slightly from the sums of monthly figures. *Estimated. U. S. Bureau of Mines.

Secondary Aluminum Production

Net Tons

	From New Scrap	From Old Scrap	Total	As Metal	As Alloys†
1956	268,095	71,673	339,768	9,471	330,297
1955	259,622	76,372	335,994	9,023	326,971
1954	232,052	59,989	292,041	5,752	286,289
1953	289,626	78,940	368,566	5,203	363,363
1952	233,258	71,264	304,522	4,897	299,625
1951	216,017	76,591	292,608	5,341	287,267
1950	167,308	76,358	243,666	2,140	241,526
1949	136,166	44,596	180,762	343	180,419
1948	191,129	95,648	286,777	2,384	284,393
1947	180,990	163,847	344,837	5,105	339,732
1946	187,538	90,535	278,073	2,075	275,998

†Also includes chemical compounds.
U. S. Bureau of Mines.

Bauxite Production and Imports

Gross Tons—Quarterly figures are preliminary, and their sums differ slightly from final annual totals.

	—Mine Production (dried equiv.)— Arkansas	Ala., Ga., Va.	Total	Imports as Shipped	Total New Supply
1957					
1st Qtr.	356,438	11,771	368,209	1,431,013	1,802,222
2nd Qtr.	356,921	12,988	369,909	1,616,271	1,986,180
1956	1,668,432	74,912	1,743,344	5,670,013	7,413,357
1st Qtr.	475,411	15,580	490,991	1,344,072	1,835,063
2nd Qtr.	455,763	15,053	470,816	1,400,017	1,870,833
3rd Qtr.	327,801	29,519	357,320	1,438,240	1,795,560
4th Qtr.	409,457	14,760	424,217	1,487,684	1,911,901
1955	1,721,243	67,098	1,788,341	4,882,373	6,670,714
1st Qtr.	469,169	17,574	486,743	1,212,548	1,699,291
2nd Qtr.	459,047	15,100	474,147	1,217,442	1,691,589
3rd Qtr.	379,197	23,243	402,440	1,383,130	1,785,570
4th Qtr.	413,830	11,181	425,011	1,407,888	1,832,899
1954	1,949,368	45,528	1,994,896	4,988,243	6,983,139
1953	1,529,976	49,763	1,579,739	4,230,573	5,810,312
1952	1,603,833	63,214	1,667,047	3,461,901	5,128,948
1951	1,815,274	33,402	1,848,676	2,819,676	4,668,352
1950	1,307,335	27,192	1,334,527	2,516,247	3,850,774
1949	1,094,924	53,868	1,148,792	2,688,161	3,836,956
1948	1,395,341	61,807	1,457,148	2,488,915	3,946,063
1947	1,153,563	48,492	1,202,055	1,821,580	3,023,635
1946	1,019,118	53,707	1,072,825	852,005	1,924,830

U. S. Bureau of Mines.

Aluminum Wrought Products

Producers' Shipments, Thousands of Pounds

Period	Total	Plates, Sheets, and Strip	Rolled Structural Shapes, Rods, Bar, Wire	Extruded Shapes, Blooms, and Tubing	Powder, Flake, and Paste; Forgings†
1957*	2,752,000	1,448,000	414,000	790,000	100,000
Jan. ...	234,805	126,008	35,911	64,227	8,659
Feb. ...	206,397	109,786	30,330	58,296	7,985
Mar. ...	229,786	120,077	34,365	66,400	8,944
Apr.	260,517	143,859	37,971	69,546	9,141
May ...	249,012	130,047	35,680	74,363	8,922
June ...	227,388	117,103	32,847	69,411	8,027
July	249,047	130,624	39,342	71,339	7,742
Aug.	223,786	117,796	30,918	66,876	8,196
Sept.	215,564	111,271	33,251	63,421	7,621
1956	2,885,808	1,568,117	421,201	792,403	104,087
Jan.	251,639	142,049	33,875	67,499	8,216
Feb.	240,705	134,077	33,433	65,261	7,934
Mar.	279,119	156,002	38,272	75,800	9,045
Apr.	260,517	143,859	37,971	69,546	9,141
May	264,308	147,613	39,900	68,036	8,759
June	240,562	132,510	33,666	65,519	8,867
July	247,806	139,571	35,346	64,160	8,729
Aug.	217,766	104,347	39,610	64,335	9,474
Sept.	217,425	117,074	32,159	59,462	8,730
Oct.	252,867	136,546	33,681	73,363	9,277
Nov.	218,272	114,618	31,501	64,197	7,956
Dec.	194,822	99,851	31,787	55,225	7,959
1955	2,791,791	1,542,723	367,951	775,092	106,025
1954	2,086,562	1,165,076	361,281	513,300	46,905
1953	2,286,865	1,368,165	442,046	451,922	44,732

U. S. Bureau of the Census. †Forgings included for 1955-57. *Estimated.

Antimony Imports

Net Tons

Year	—Antimony Ore— Gross Weight	Sb Content	Needle or Liquidated Sb	Antimony Metal	Type Metal & Antimonial Lead†	Antimony Oxide
1956...	17,424	6,571	46	4,320	(n.a.)	1,179
1955...	16,209	7,470	46	3,667	(n.a.)	2,210
1954...	12,870	4,722	33	2,802	4,088	1,476
1953...	17,242	7,778	17	2,612	1,350	1,296
1952...	18,246	7,915	34	3,354	1,494	1,766
1951...	26,698	11,746	6	2,231	465	2,039

U. S. Bureau of Mines. (n.a.)—Not available. †Estimated Sb content

Antimony Consumption

Industrial use of primary antimony—Net Tons

PRODUCTS	1956	1955	1954	1953
Ammunition	14	5	5	3
Antimonial Lead & Battery Metal...	2,907	2,519	3,114	5,300
Bearing Metal & Bearings	1,077	831	816	1,000
Cable Covering ..	190	146	156	60
Castings	57	67	70	80
Collapsible Tubes & Foil	12	24	47	60
Sheets & Pipe	300	157	238	170
Solder	144	131	148	200
Type Metal	528	598	613	700
Other Metal	137	161	118	127
Nonmetal Products	7,531	7,833	6,855	6,600
Totals	12,897	12,472	12,180	14,300

U. S. Bureau of Mines.

Antimony Production

Domestic mine production of ores and concentrates—Net Tons

Year	Gross Weight	—Antimony Content— Quantity	Average Per Cent
1956.....	3,505	590	16.9
1955.....	3,967	633	16.0
1954.....	4,685	766	16.4
1953.....	2,161	372	17.2
1952.....	4,854	2,160	44.5
1951.....	9,401	3,472	37.0

U. S. Bureau of Mines.

Magnesium Wrought Products

Shipments—Thousands of Pounds

	1957	1956	1955	1954	1953	1952
Jan.	2,130	2,118	1,776	972	1,313	1,646
Feb.	2,522	1,901	1,648	1,058	1,454	1,759
Mar.	2,388	2,351	1,947	1,290	1,601	1,723
Apr.	2,511	2,279	1,756	892	1,708	1,756
May	2,230	2,462	1,836	1,128	1,699	1,786
June	1,881	2,302	1,678	1,312	1,192	1,427
July	1,428	2,002	1,437	1,032	1,589	1,390
Aug.	1,539	2,523	1,742	1,111	1,433	1,438
Sept.	1,502	2,031	2,158	1,183	1,254	1,299
Oct.	...	861	1,666	1,002	1,409	1,408
Nov.	....	2,141	1,954	1,243	1,314	1,177
Dec.	....	2,452	1,576	1,673	919	1,440
Totals	....	25,423	21,174	13,743	16,885	18,249

U. S. Bureau of Mines.

Nonferrous Metals

METALWORKING FACTS AND FIGURES

U.S. Tin Imports

Ore (tin content) and Metal (bars, blocks, pigs, etc.) in Gross Tons

1957	Ore	Metal
Jan.	15	4,746
Feb.	0	3,364
Mar.	23	5,231
Apr.	10	4,427
May	0	6,223
June	0	3,748
July	88	5,962
Aug.	0	4,826
MONTHLY AVERAGES		
1956	1,390	5.217
1955	1,676	5,393
1954	1,845	5.470
1953	2,998	6.212
1952	2,208	6,704
1951	2,469	2,315
1950	2,169	6.910
1949	3,193	5.019
1948	3,124	4,060

International Tin Study Group.

U.S. Silver Output

(Thousands of ounces; commercial bars, 0.999 fine, and other refined forms)

	From Domestic Ore†	From Foreign Ore	Total
1957*	34,700	34,000	68,700
Jan.	2.997	2,877	5,874
Feb.	2,925	2,876	5,801
Mar.	3,360	3.166	6.526
Apr.	3,735	2,807	6,542
May	2,486	1,388	3,874
June	3,386	2,880	6,266
July	2,859	3,452	6,311
Aug	2,500	2,558	5,058
Sept.	2,937	3,263	6,200
1956	38,157	40,160	78,317
1955	37,500	40,000	77,500
1954	38,059	39,422	77,481
1953	34,697	37,764	72,461
1952	40,245	36,653	76,898
1951	39,967	33,837	73,804
1950	42,068	37,656	79,724
1949	34,559	28,226	62,785

†Includes purchases of crude silver by the U. S. Mint. *Estimated. American Bureau of Metal Statistics.

Magnesium Ingot Production

Net Tons

	1957	1956	1955	1954
Jan.	7,111	6,337	5,089	6,446
Feb.	6,399	5,908	4,646	5,856
Mar.	7,175	6,348	4,942	6,545
Apr.	7,020	6,081	1,859	6,203
May	7,028	6,359	4,277	6,460
June	6,534	6,098	4,757	6,190
July	6,598	1,136	5,112	6,049
Aug.	6,957	3,314	5,880	5,770
Sept.	6,296	6,128	5,923	5,325
Oct.	6,277	6,735	6,286	5,148
Nov.	....	6,818	6,130	4,942
Dec.	....	7,085	6,229	4,789
Totals	80,000*	68,347	61,130	69,723

Magnesium Association. *Estimated.

U.S. Tin Consumption

Gross Tons

1957	Consumption Primary	Consumption Secondary	Consumption Total	Stocks
Jan.	5,440	2,555	7,995	34,725
Feb.	5,000	2,140	7,140	32,975
Mar.	5,110	2,290	7,400	33,975
Apr.	5,060	2,530	7,590	34,700
May	4,840	2,465	7,305	35,565
June	4,555	2,265	6,820	35,295
July	4,345	2,125	6,470	35,915
Aug.	4,835	2,385	7,220	36,005
Sept.	4,385	2,275	6,660	36,750
1956	60,470	29,854	90,324	36,381
1955	59,828	30,655	90,483	35,362
1954	54,427	28,464	82,891	29,552
1953	53,959	31,681	85,640	51,546
1952	45,323	27,950	73,273	46,625
1951	56,884	31,285	88,169	31,532
1950	71,191	33,273	104,464	63,486
1949	47,163	25,243	72,406	59,813
1948	59,863	30,925	90,789	63,517
1947	59,166	28,934	88,100	68,728
1946	54,627	26,316	80,943	60,585
1945	55,642	27,941	83,583	71,408

International Tin Study Group; U. S. Bureau of Mines.

Nickel Production

Net Tons

	Canada	Other Countries†	Estimated Totals
1957*	180,000	65,000	245,000
1956	178,750	52,250	231,000
1955	174,950	40,050	215,000
1954	161,250	30,750	192,000
1953	143,000	27,000	170,000
1952	140,020	23,020	163,580
1951	137,900	46,100	184,000
1950	123,660	38,340	162,000
1949	128,690	32,310	161,000
1948	131,740	34,660	166,400
1947	118,621	35,679	154,300
1946	96,062	42,538	138,600
1945	122,565	37,435	160,000
1944	137,299	35,701	173,000
1943	144,009	40,091	184,100
1942	142,606	31,594	174,200
1941	141,129	37,471	178,600
1940	122,779	31,521	154,300

*Estimated. †Free World. U. S. Bureau of Mines; Dominion Bureau of Statistics; STEEL.

Tungsten

U. S. Mines—Pounds

1957	Production	Shipments	Industry Stocks
Jan.	1,095,000	414,000	5,329,000
Feb.	842,000	400,000	5,522,000
Mar.	896,000	488,000	6,217,000
Apr.	793,000	321,000	6,952,000
May	774,000	408,000	7,108,000
June	637,000	461,000	6,555,000
1956	14,761,000	14,027,000	4,457,000
1955	15,833,000	15,619,000	4,025,000
1954	13,166,000	13,030,000	4,275,000
1953	9,259,000	9,128,000	4,698,000
1952	7,233,000	7,244,000	3,024,000

U. S. Bureau of Mines.

U.S. Tin Smelter Output

Gross Tons

	1957	1956	1955	1954	1953
Jan.	1,564	1,754	2,402	2,750	4,000
Feb.	0	1,704	2,505	3,009	3,400
Mar.	0	1,802	2,353	3,559	3,850
Apr.	0	1,803	2,103	3,006	3,750
May	0	2,001	1,604	2,054	3,100
June	0	953	851	1,205	3,000
July	0	0	952	0	3,000
Aug.	0	1,453	1,749	2,002	2,600
Sept.	0	1,378	1,751	2,404	2,700
Oct.	0	1,801	1,803	2,404	2,751
Nov.	0	1,887	1,803	2,205	2,750
Dec.	0	1,503	2,453	2,404	2,750
Totals	1,564*	17,631	22,329	27,002	37,562

*Estimated. U. S. Bureau of Foreign & Domestic Commerce.

World Tin

Gross Tons

	Production	Consumption	Stocks
1957*	167,800	163,200	72,000
Jan.	15,600	14,300	69,900
Feb.	11,900	13,600	69,500
Mar.	16,300	13,800	67,893
Apr.	14,000	13,600	71,288
May	13,700	13,900	66,406
June	12,800	13,100	67,123
July	13,500	12,900	68,096
Aug.	13,500	12,700	69,000
1956	177,000	160,000	70,300
1955	178,500	154,500	66,800
1954	184,500	142,500	67,000
1953	181,000	134,500	62,200
1952	168,500	132,500	100,400
1951	168,000	140,000	93,000
1950	174,000	152,000	118,200
1949	168,000	114,000	130,800
1948	157,500	129,000	133,100
1947	124,500	123,500	135,200
1946	90,500	113,000	153,000

*Estimated.
International Tin Study Group. Figures are partly estimated and include substantial revisions from previously reported totals.

Molybdenum Products

Comprises ferromolybdenum, molybdic oxide, and molybdenum salts and metal

Pounds

1957	Production	Shipments†	Stocks‡
Jan.	3,825,000	3,524,000	3,190,000
Feb.	3,446,000	3,630,000	3,154,000
Mar.	3,777,000	3,909,000	3,096,000
Apr.	3,607,000	3,533,000	3,345,000
May	3,995,000	3,686,000	3,729,000
June	3,578,000	3,599,000	3,799,000
July	1,105,000	2,359,000	2,650,000
1956	41,208,000	42,820,000	2,812,000
1955	37,774,000	38,606,000	3,156,000
1954	24,328,000	25,357,000	3,430,000
1953	30,283,000	30,701,000	3,894,000
1952	32,383,000	32,054,000	3,373,000
1951	32,775,000	31,232,700	3,037,200

†Including exports. ‡Producers'.
U. S. Bureau of Mines.

Manganese

(Supplies for U S. consumption, net tons)

1957	Domestic Mine Shipments	General Imports Ore	General Imports Ferro-manganese†	Exports Ore	Exports Ferro-manganese†	Net Supply
8 Mo.	244,800	2,000,454	249,804	3,443	15,240	2,793,000
Jan.	32,700	251,062	59,554	365	346	343,000
Feb.	26,000	132,031	13,734	291	432	171,000
Mar.	28,200	277,081	62,038	482	292	367,000
Apr.	32,700	298,516	33,144	331	364	364,000
May	30,900	225,443	10,782	500	126	266,000
June	30,800	258,249	31,396	449	2,506	317,000
July	31,700	286,446	20,594	483	5,390	333,000
Aug.	31,800	271,626	18,562	542	5,784	316,000
1956	343,000	2,230,583	488,436	6,131	5,984	3,050,000
1955	287,255	2,088,420	242,658	6,279	4,488	2,608,000
1954	206,128	2,165,694	116,088	6,112	4,348	2,477,000
1953	157,536	3,500,986	252,012	6,894	2,936	3,901,000

†Expressed in terms of ore.

U. S. Bureau of Mines.

Molybdenum Concentrates

Pounds

1957	Production	Shipments†	Consumption	Stocks
Jan.	5,301,000	5,085,000	3,967,000	2,976,000
Feb.	4,504,000	4,649,000	3,548,000	2,996,000
Mar.	4,850,000	4,714,000	3,832,000	2,920,000
Apr.	4,790,000	4,902,000	3,735,000	2,885,000
May	5,383,000	5,330,000	4,082,000	2,975,000
June	5,028,000	4,888,000	3,619,000	2,984,000
July	4,678,000	4,785,000	1,154,000	3,239,000
1956	57,462,000	57,126,000	42,652,000	2,920,000
1955	61,781,000	64,709,000	38,799,000	2,730,000
1954	58,668,000	64,021,000	24,710,000	5,317,000
1953	57,243,000	53,823,000	31,193,000	11,326,000
1952	43,259,000	42,717,000	32,715,000	6,856,000

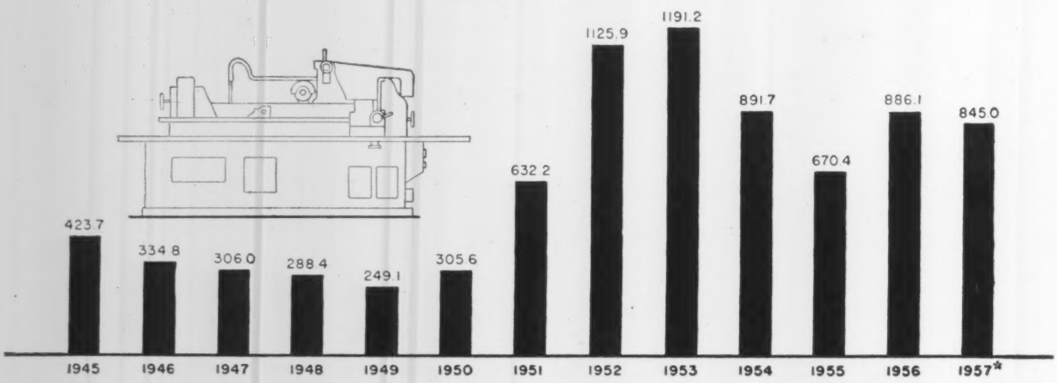
†Including exports, plus concentrates converted to oxide at Miami, Ariz., and Langeloth, Pa.
U. S. Bureau of Mines.

Machine Tools

METALWORKING FACTS AND FIGURES

YEARLY SHIPMENTS

Millions of Dollars



MACHINE TOOLS (Metal Cutting Types Only)

NET NEW ORDERS† (Thousands)

	1957			1956		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Jan.	$56,300	$6,950	$63,250	$96,700	$12,850	$109,550
Feb.	51,100	7,100	58,200	72,350	8,950	81,300
Mar.	51,300	7,600	58,900	80,050	9,450	89,500
Apr.	45,700	5,600	51,300	74,000	5,300	79,300
May	37,950	3,450	41,400	79,450	7,650	87,100
June	40,050	3,050	43,100	55,650	6,200	61,850
July	50,500	5,000	55,500	55,250	6,650	61,900
Aug.	40,400	4,100	44,500	78,250	9,250	87,500
Sept.	25,000	3,800	28,800	68,800	9,650	78,450
Oct.	23,700	4,150	27,850	57,550	8,550	66,100
Nov.	.....	....	.....	58,700	5,550	64,250
Dec.	.....	....	.....	51,900	5,300	57,200
10 Mo. Totals	$422,000	$50,800	$472,800			
Annual Totals				$828,650	$95,350	$924,000

YEARLY TOTALS

	Domestic	Foreign	Total
1955	$846,250	$80,850	$927,100
1954	458,150	56,300	514,450
1953	692,250	55,800	748,050
1952	748,950	53,600	802,550
1951	1,364,450	163,500	1,527,950
1950	596,500	115,950	712,450
1949	169,600	63,500	233,100
1948	217,950	43,000	260,950
1947	186,500	53,550	240,050
1946	222,750	88,350	311,100

†Gross orders minus cancellations.

SHIPMENTS (Thousands)

	1957			1956		
	Domestic	Foreign	Total	Domestic	Foreign	Total
Jan.	$67,550	$9,000	$76,550	$49,400	$5,200	$54,600
Feb.	72,050	5,650	77,700	58,700	5,900	64,600
Mar.	78,800	10,300	89,100	67,850	6,300	74,150
Apr.	77,650	10,150	87,800	65,000	6,800	71,800
May	70,900	7,600	78,500	70,500	6,300	76,800
June	72,850	10,100	82,950	69,550	6,700	76,250
July	51,500	7,200	58,700	60,700	4,450	65,150
Aug.	58,000	5,200	63,200	69,000	6,100	75,100
Sept.	58,600	6,150	64,750	65,400	5,700	71,100
Oct.	53,500	7,400	60,900	79,850	9,900	89,750
Nov.	.....	....	.....	73,600	8,100	81,700
Dec.	.....	....	.....	75,050	10,100	85,150
10 Mo. Totals	$661,400	$78,750	$740,150			
Annual Totals				$804,600	$81,550	$886,150

National Machine Tool Builders' Association. *Estimated.

YEARLY TOTALS

	Domestic	Foreign	Total
1955	$600,000	$74,000	$670,400
1954	813,250	78,500	891,750
1953	1,078,050	113,150	1,191,200
1952	1,003,200	122,700	1,125,900
1951	569,000	63,250	632,250
1950	245,950	59,600	305,550
1949	186,850	62,300	249,150
1948	237,700	50,750	288,450
1947	224,600	81,400	306,000
1946	247,100	87,700	334,800

METALWORKING MACHINERY (Forming and Shaping Types)

VALUE OF SHIPMENTS (thousands)

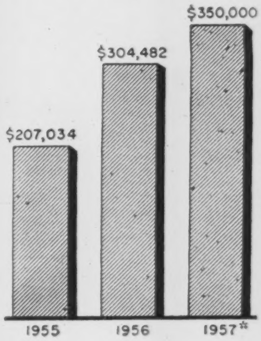
	Bending, Forming Machines	Hydraul., Pneumatic Presses	Mechanical-Power Driven Presses	Manual Presses	Punching, Shearing Machines	Forging Machines, Hammers	Wire, Met. Ribbon Form. Machines	Riveting Machines	Misc. Forming, Cutting Machines
1957									
1st Qtr.	$8,667	$57,450	$44,830	$187	$8,406	$2,641	$643	$973	$2,919
2nd Qtr.	8,848	10,792	42,003	131	6,568	3,579	854	883	2,718
3rd Qtr.	5,469	5,821	28,685	72	4,726	2,189	498	342	2,277
1956	30,174	25,045	195,243	664	25,776	10,814	2,932	3,916	9,918
1955	23,518	33,116	108,853	320	18,333	9,583	3,011	3,106	7,194

VALUE OF NEW ORDERS (thousands)

	Bending, Forming Machines	Hydraul., Pneumatic Presses	Mechanical-Power Driven Presses	Manual Presses	Punching, Shearing Machines	Forging Machines, Hammers	Wire, Met. Ribbon Form. Machines	Riveting Machines	Misc. Forming, Cutting Machines
1957									
1st Qtr.	$6,242	$8,719	$18,209	$131	$4,854	$1,878	$619	$555	$2,187
2nd Qtr.	6,127	8,087	12,544	79	1,881	2,196	379	732	1,872
3rd Qtr.	4,099	4,021	7,929	43	4,763	966	310	334	1,187
1956	25,545	39,509	117,618	542	23,520	12,290	2,680	2,598	10,182
1955	28,489	27,967	268,712	637	22,730	12,235	4,094	3,188	10,055

U. S. Bureau of the Census. *Estimated.

FACTORY SHIPMENTS
(Value in thousands)

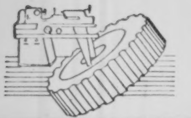


PRODUCERS' SHIPMENTS OF MACHINE TOOLS

CLASSES	1957† Dollar Value and No. Units	1956 Dollar Value and No. Units	1955 Dollar Value and No. Units	1954 Dollar Value and No. Units	1953 Dollar Value and No. Units	1952 Dollar Value and No. Units
Boring Machines	$80,117,000 n.a.	$112,305,000 n.a.	$86,179,000 n.a.	$113,606,000 n.a.	$163,648,000 4,650 Units	$152,341,000 4,374 Units
Broaching Machines	14,850,000 n.a.	19,153,000 n.a.	16,510,000 n.a.	17,253,000 n.a.	21,874,000 799 Units	22,678,000 1,105 Units
Drilling Machines	39,191,000 n.a.	76,181,000 n.a.	89,633,000 n.a.	85,057,000 n.a.	114,258,000 n.a.	108,948,000 30,492 Units
Gear-Cutting and Finishing Machines ..	26,256,000 n.a.	55,506,000 n.a.	42,249,000 n.a.	46,711,000 n.a.	44,891,000 2,546 Units	47,462,000 2,725 Units
Grinding and Polishing Machines (except gear-tooth grinding, honing, lapping, polishing, and buffing machines)	97,220,000 n.a.	137,085,000 n.a.	98,043,000 n.a.	154,340,000 n.a.	219,287,000 93,804 Units	210,124,000 89,146 Units
Lathes	153,712,000 n.a.	220,862,000 n.a.	155,922,000 n.a.	206,885,000 n.a.	312,165,000 43,077 Units	281,587,000 44,525 Units
Milling Machines	101,299,000 n.a.	115,094,000 n.a.	95,821,000 n.a.	119,775,000 n.a.	196,124,000 17,525 Units	159,331,000 16,252 Units
Planers	6,476,000 n.a.	6,913,000 n.a.	8,292,000 n.a.	10,978,000 n.a.	10,445,000 164 Units	8,641,000 158 Units
Shapers (except gear shapers)	....	....	....	11,582,000 n.a.	10,932,000 1,495 Units	9,755,000 1,493 Units
All Other	99,822,000 n.a.	90,566,000 n.a.	41,145,000 n.a.	124,482,000 n.a.	75,735,000 n.a.	76,013,000 n.a.
Totals	$618,943,000 n.a.	$833,665,000 n.a.	$633,794,000 n.a.	$890,669,000 n.a.	$1,169,359,000 n.a.	$1,076,880,000 n.a.

U. S. Bureau of the Census. †Three quarters.

n.a.=not available.



Machinery & Equipment

METALWORKING FACTS AND FIGURES

Industrial Trucks and Tractors

Units Shipped

ELECTRIC TRUCKS (Rider Type)

	1957	1956	1955	1954	1953
Jan.	480	409	342	523	704
Feb.	385	491	359	467	779
Mar.	411	503	425	473	832
Apr.	455	503	406	366	732
May	429	520	833	445	677
June	433	533	533	445	945
July	420	512	455	413	673
Aug.	242	374	346	357	626
Sept.	302	442	441	357	797
Oct.	...	491	449	348	877
Nov.	...	501	441	359	677
Dec.	...	442	520	394	673
Totals	...	5.721	5.550	4.947	8,992

YEARLY TOTALS

1952	7.409	1950	2.808
1951	6.525	1949	2,600

HAND TRUCKS (Motorized)

1957

Jan.	602	July	611
Feb.	559	Aug.	354
Mar.	583	Sept.	476
Apr.	606	Oct.	...
May	618	Nov.	...
June	536	Dec.	...
1956	7,740	1955	6.691

GASOLINE-POWERED TRUCKS AND TRACTORS

1957

Jan.	1,837	July	1,651
Feb.	1,610	Aug.	1,926
Mar.	1,909	Sept.	1,661
Apr.	1,941	Oct.	....
May	1,737	Nov.	....
June	1,869	Dec.	....
1956	25,716	1955	26,843

U. S. Bureau of the Census.

Blowers and Fans

Shipments—Thousands of Dollars

Qtrs.	1957	1956	1955	1954
1st	58.077	59.882	59.992	58.327
2nd	61.247	74.674	59.743	62.011
3rd	......	51.542	63.654	45.170
4th	......	44.389	48.110	39.557
Totals	......	230.487	231.499	205.065

U. S. Bureau of the Census.

Air Washers

Shipments—Thousands of Dollars

Qtrs.	1957	1956	1955	1954
1st	749	508	302	207
2nd	829	579	408	343
3rd	...	636	262	436
4th	...	590	341	385
Totals	...	2.313	1.313	1.371

U. S. Bureau of the Census.

Unit Heaters

Shipments—Thousands of Dollars

Qtrs.	1957	1956	1955	1954
1st	18.024	16.825	15.052	13.693
2nd	18.965	19.084	15.611	12.245
3rd	......	19.795	16.599	14,017
4th	......	21.908	21.818	18.114
Totals	......	77.612	69.080	58.069

U. S. Bureau of the Census.

Electric Fans*

Domestic Sales—Units

1956	1.631.639	1954	2.356.394
1955	1.362.167	1953	1.874.137

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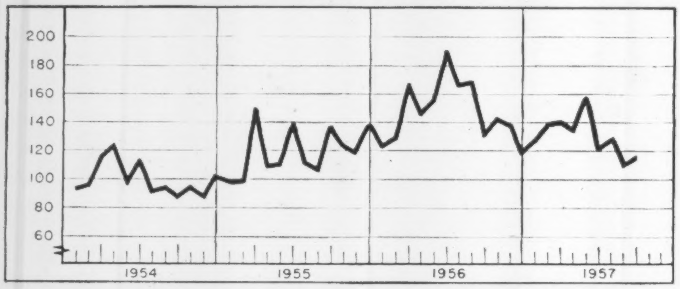
*Year of record runs from Sept. 1 of preceding year to Aug. 31.

National Electrical Manufacturers Association.

MATERIAL HANDLING EQUIPMENT

(Bookings Index—1954=100)



	1957	1956	1955	1954
Jan.	126.34	122.43	97.00	93.56
Feb.	139.29	129.56	98.71	96.45
Mar.	140.76	166.14	149.16	115.55
Apr.	134.67	145.20	109.52	122.76
May	157.95	155.53	110.50	98.54
June	121.57	189.13	139.00	112.42
July	128.31	165.50	111.76	91.68
Aug.	110.09	168.70	106.20	94.06
Sept.	116.79	130.35	136.80	88.43
Oct.	.....	143.38	123.52	95.41
Nov.	.....	138.50	118.09	88.66
Dec.	.....	117.76	139.85	102.49

YEARLY AVERAGES

1957 (9 Mo.)	130.64	1955	120.01
1956	147.68	1954	100.00

Material Handling Institute Inc.

Air Conditioning, Commercial Refrigeration Equipment

Factory Shipments—Number of Units and Value in Thousands of Dollars

	CONDENSING UNITS		COMPRESSORS, COMPRESSOR UNITS		ICEMAKING MACHINES	
	Number	Value	Number	Value	Number	Value
1956	619.922	82.290	3,780.931	166.220	31.416	18.112
1955	589.335	71.067	2.554.031	116.917	31.521	16.369
1954	570.418	63.699	n.a.	127,076	n.a.	11.960
1953	966.136	74,013	2.380.739	121.054	28.228	14,385
1952	654,223	61.439	1,677.300	71.047	26.693	12.838
1951	840.176	75.672	1,051,937	56.669	12,998	8.804
1950	885,913	75.833	954,368	46.977	14.914	8.907
1949	610.341	53.534	604,431	29.929	6.902	4.641

	CENTRIFUGAL REFRIGERATION SYSTEMS		HEAT EXCHANGER EQUIPMENT		PACKAGED AIR CONDITIONING EQUIPMENT	
	Number	Value	Number	Value	Number	Value
1956	921	29.105	......	146.486	1.828.047	291.445
1955	818	25.732	......	114.064	1.283.234	209.961
1954	556	19,868	......	107.923	1.353.204	241.871
1953	469	14.970	......	82.602	1.137.293	293.644
1952	363	14,040	......	63.666	438.464	135.579
1951	441	15.300	......	64.935	282.488	93.573
1950	382	12.249	......	61,337	257.263	86.913
1949	285	8.189	......	40.925	123.709	50.584

U. S. Bureau of the Census.

n.a.=not available.

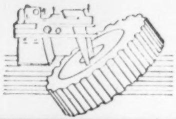
Industrial Control Apparatus

Sales

Qtrs.	1957	1956	1955	1954	1953	1952
1st	n.a.	$57,554.580	$41.932.375	$45.125.499	$50.057,978	$50,265.710
2nd	n.a.	70,428.185	48.017.382	47,066.497	53.213.139	54,427.788
1st Half	$150,011,184	127,982,765	89,949.757	92,191,996	103,271,117	104,693,498
3rd	....	68,032,797	48,617,670	41,922,808	49,444,714	49,085,727
4th	....	n.a.	55,597,851	45,138,667	52,641,399	55,129,668
Totals	....	$273.690.705	$194,165,278	$179,253,471	$205,357,230	$208.908.893

n.a.=not available.

National Electrical Manufacturers Association.



Machinery & Equipment

METALWORKING FACTS AND FIGURES

Industrial Supplies and Machinery

Seasonally Adjusted New Order Index—July, 1948=100

	1957	1956	1955	1954	1953	1952
January	221	190	160	141	163	n.a.
February	219	190	166	138	162	n.a.
March	210	190	171	133	170	n.a.
April	203	195	172	130	176	n.a.
May	199	199	177	127	171	n.a.
June	199	197	189	132	164	n.a.
July	197	203	182	132	162	n.a.
August	197	211	186	136	159	145
September	203	203	196	143	148	146
October	192	206	195	141	147	157
November	...	220	194	144	148	155
December	...	218	191	152	145	158
Mo. Avg	...	.202	182	137	160	n.a.

American Supply & Machinery Manufacturers' Association Inc. n.a.=not available.

Screw Machine Products

Index—1946-49=100

SHIPMENTS

	1957	1956	1955	1954	1953
Jan.	206	216	173	174	244
Feb.	185	214	174	161	225
Mar.	197	215	199	171	256
Apr.	193	199	204	158	256
May	192	191	201	146	252
June	173	178	212	143	250
July	139	137	144	109	215
Aug.	173	172	187	140	232
Sept.	168	164	190	143	217
Oct.	184	202	201	154	217
Nov.	..	180	198	148	188
Dec.	...	167	195	158	178

Yearly Averages

1956	186	1954	150
1955	190	1953	228
1952	198		

NEW ORDERS

	1957	1956	1955	1954	1953
Jan.	211	208	186	130	193
Feb.	181	207	191	118	236
Mar.	185	224	239	131	259
Apr.	183	184	198	133	251
May	167	165	201	123	208
June	166	154	191	126	215
July	159	142	183	114	174
Aug.	147	170	220	133	153
Sept.	181	143	208	150	134
Oct.	184	213	216	151	162
Nov.	...	175	200	166	139
Dec.	...	167	203	199	130

Yearly Averages

1956	179	1954	139
1955	203	1953	188
1952	194		

National Screw Machine Products Association.

Heat Treating

Billings—Thousands of Dollars

	1957	1956	1955
Jan.	3,494.7	3,116.4	2,181.0
Feb.	3,337.9	3,124.8	2,184.5
Mar.	3,571.6	3,330.9	2,599.5
Apr.	3,462.6	3,166.2	2,579.5
May	3,311.4	3,350.7	2,644.4
June	2,912.1	3,065.2	2,645.1
July	2,767.5	2,737.4	2,180.0
Aug.	2,830.8	3,136.6	2,535.6
Sept.	2,708.8	2,858.6	2,666.8
Oct.	3,021.6	3,468.5	2,897.2
Nov.	.....	3,205.7	2,935.7
Dec.	.....	2,931.2	2,891.1

Metal Treating Institute.

Foundry Equipment Sales

Index of Net Orders Closed for New Equipment
1947-49=100

	1957	1956	1955
January	117.9	195.6	81.0
February	188.4	169.0	90.4
March	127.0	152.7	163.6
April	101.1	135.2	178.6
May	136.2	207.0	145.7
June	187.5	156.7	186.8
July	98.6	110.3	213.4
August	231.3	188.3	134.0
September	113.9	114.7	156.7
October	....	122.2	108.6
November	....	121.0	154.4
December	....	115.6	183.9
Mo. Avg	....	149.0	149.8

Foundry Equipment Manufacturers Association.

Typewriters

	Factory Shipments (Units)		Domestic Sales (Units)	
	1957	1956	1957	1956
Jan.	136,026	92,748	96,948	78,604
Feb.	113,224	99,500	121,529	87,353
Mar.	133,075	125,184	121,853	124,239
Apr.	143,012	106,537	118,628	81,011
May	136,839	110,031	119,136	86,733
June	141,960	105,391	120,045	94,931
July	124,625	86,607	127,539	87,641
Aug.	147,105	131,769	146,280	121,596
Sept.	155,060	153,293	151,020	154,820
Oct.	......	175,179	......	157,507
Nov.	......	160,966	......	136,176
Dec.	......	150,499	......	157,334

ANNUAL TOTALS

	Factory Shipments		Domestic Sales	
	Units	Value (000)	Units	Value (000)
1956	1,500,704	$182,859	1,367,945	$255,494
1955	1,258,466	148,008	1,135,393	202,315

U. S. Bureau of the Census.

Office Machines

(Value, f.o.b. Plant)

	Computing, Account. Machines	Duplicating Machines	Other
1956	$533,535,000	$26,812,000	$137,492,000
1955	431,577,000	22,288,000	115,514,000
1954	394,879,000	22,995,000	167,346,000
1953	365,669,000	24,260,000	119,960,000

U. S. Bureau of the Census.

Steel Power Boilers

New Orders

(100 sq ft or more of heating surface)

GRAND TOTAL—ALL TYPES

	Number	Sq ft
1956	7,172	16,847,961
1955	6,420	12,782,535
1954	5,496	8,472,185
1953	5,693	9,440,439
1952	5,815	12,707,581
1951	7,452	19,224,576
1950	7,996	16,868,565
1949	5,266	8,379,502
1948	6,507	13,592,766

STATIONARY BOILERS

	Number	Sq ft
1956	6,949	15,079,239
1955	6,310	12,394,955
1954	5,420	8,044,518
1953	5,658	9,243,028
1952	5,556	11,693,401
1951	7,171	17,698,094
1950	7,827	16,468,567
1949	5,190	8,097,503
1948	6,354	12,628,660

MARINE BOILERS

	Number	Sq ft
1956	223	1,768,722
1955	97	387,580
1954	76	427,667
1953	35	197,411
1952	259	1,014,180
1951	281	1,526,482
1950	169	399,998
1949	76	281,999
1948	153	964,106

Steam Generating Capacity of Water Tube Boilers

(Thousands of pounds of steam per hour at maximum continuous rating)

	Total	Stationary	Marine
1956	247,035	226,840	20,195
1955	164,120	157,295	6,825
1954	90,669	90,669†	n.a.
1953	82,263	80,634	1,629
1952	129,474	121,374	8,100
1951	209,088	194,082	15,006
1950	187,514	184,831	2,683
1949	67,678	62,745	4,933
1948	119,650	109,762	9,888

†Includes marine boilers.
n.a.=not available.
U. S. Bureau of the Census.

Motors and Generators

New Orders—Thousands of Dollars

Polyphase Induc. Motors, 1-200 hp

Qtrs.	1957	1956	1955
1st	49,467	53,266	38,649
2nd	49,188	61,186	44,407
3rd	44,640	55,187	49,969
4th	.....	50,155	47,303
Totals	.....	219,794	180,328

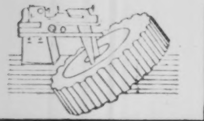
DC Generators & Motors, 1-200 hp

Qtrs.	1957	1956	1955
1st	14,947	11,509	6,729
2nd	8,317	12,528	10,545
3rd	8,625	12,136	9,950
4th	.....	10,645	12,986
Totals	.....	46,818	40,210

YEARLY TOTALS

Polyphase Induc. Motors, 1-200 hp		DC Generators & Motors, 1-200 hp	
1954	139,949	1954	32,376
1953	165,875	1953	32,133
1952	152,801	1952	40,483
1951	209,861	1951	43,318
1950	155,308	1950	28,874
1949	76,063	1949	16,900
1948	95,577	1948	22,273
1947	122,043	1947	20,381

National Electrical Manufacturers Assn.



Machinery & Equipment

EARTHMOVING and EXCAVATING EQUIPMENT

(Value in thousands of dollars)

Total Manufacturers' Shipments†

1957	
1st Qtr.	$228,926
2nd Qtr.	226,535
3rd Qtr.	181,369
4th Qtr.	......
1956	$970,142
1955	726,218
1954	543,352
1953	612,013
1952	623,261

†Does not include power cranes and shovels.

Wheel-Type Heavy Duty Industrial Tractors

	Units	Value
1957	.....	......
1st. Qtr.	1,513	$28,600
2nd Qtr.	1,753	34,877
3rd Qtr.	1,346	27,528
4th Qtr.	.....	......
1956	5,339	$94,587
1st Qtr.	1,240	20,753
2nd Qtr.	1,589	27,388
3rd Qtr.	1,429	26,256
4th Qtr.	1,081	20,190
1955	4,144	$64,173
1954	3,019	46,801
1953	2,944	43,681
1952	4,026	59,847

Road Construction and Maintenance Machinery

	Units	Value
1957	....	......
1st Qtr.	....	$49,977
2nd Qtr.	....	56,932
3rd Qtr.	.....	48,683
4th Qtr.	....	......
1956	....	$192,236
1st Qtr.	....	45,653
2nd Qtr.	....	56,064
3rd Qtr.	....	47,548
4th Qtr.	....	42,971
1955	....	$151,410
1954	....	118,970
1953	....	119,674
1952	....	160,068

Construction Machinery for Mounting on Tractors

	Units	Value
1957	....	......
1st Qtr.	....	$27,671
2nd Qtr.	....	24,470
3rd Qtr.	....	20,164
4th Qtr.	....	......
1956	....	$114,753
1st Qtr.	....	28,791
2nd Qtr.	....	33,403
3rd Qtr.	....	28,683
4th Qtr.	....	23,876
1955	....	$94,454
1954	....	73,877
1953	....	78,440
1952	....	75,829

U. S. Bureau of the Census.

Tracklaying Tractors

	Units	Value
1957	.....	......
1st Qtr.	12,867	$119,137
2nd Qtr.	11,390	105,306
3rd Qtr.	8,340	81,671
4th Qtr.	.....	......
1956	55,417	$471,384
1st Qtr.	14,215	115,378
2nd Qtr.	16,826	142,857
3rd Qtr.	12,682	109,675
4th Qtr.	11,694	103,474
1955	48,891	$359,443
1954	40,374	267,918
1953	50,597	328,696
1952	48,155	280,841

Portable Well and Blast Hole Drills

	Units	Value
1957	....	.....
1st Qtr.	152	$1,331
2nd Qtr.	173	1,582
3rd Qtr.	115	1,127
4th Qtr.	....	.....
1956	1,209	$8,652
1st Qtr.	334	2,177
2nd Qtr.	311	2,327
3rd Qtr.	434	3,140
4th Qtr.	130	1,008
1955	1,166	$8,021
1954	1,176	8,615
1953	907	8,002
1952	732	6,769

Trucks, Truck Tractors, Trailers, and Wagons

OFF-HIGHWAY TYPE

	Units	Value
1957*	....	.....
1st Qtr.	157	1,517
2nd Qtr.	260	2,629
3rd Qtr.	132	1,375
4th Qtr.	....	.....
1956*	669	$6,552
1st Qtr.	121	999
2nd Qtr.	192	1,944
3rd Qtr.	158	1,539
4th Qtr.	198	2,070
1955	3,229	$46,527
1954	1,519	25,126
1953	1,970	31,184
1952	2,283	32,805

*Does not include off-highway type trucks (load on back).

Gears

Index of New Orders Placed

1947-49=100

	1957	1956	1955	1954
Jan.	259.3	245.5	140.9	167.4
Feb.	239.5	256.2	148.5	165.1
Mar.	262.4	276.5	172.8	128.6
Apr.	221.7	264.7	179.8	158.2
May	263.2	275.6	205.2	134.3
June	215.9	245.4	193.5	127.4
July	211.4	286.7	201.7	141.3
Aug.	225.8	219.5	217.6	154.7
Sept.	174.9	230.5	246.5	135.1
Oct.	207.0	299.8	227.6	152.3
Nov.	....	216.2	210.4	116.7
Dec.	....	235.7	245.5	182.2
Mo. Avg	....	254.4	199.2	146.9

American Gear Manufacturers Association.

Rigid Steel Conduit and Fittings

Shipments—Thousands of Feet

	1957	1956	1955
January	32,913	27,432	24,049
February	33,684	32,877	25,898
March	40,916	34,743	29,762
April	25,303	37,840	30,521
May	30,410	43,495	32,504
June	45,257	54,144	35,210
July	54,636	42,513	53,017
August	36,657	30,344	31,611
September	32,492	28,700	29,682
October	.....	31,596	32,216
November	.....	31,156	29,522
December	.....	33,318	31,052
Totals	.....	428,158	385,044

National Electrical Manufacturers Association.

Industrial Furnaces†

Net New Orders—Thousands

	1957	1956	1955
January	$7,380	$10,244	$4,973
February	8,373	12,163	5,616
March	9,090	7,025	7,345
April	3,164	8,803	7,639
May	3,994	3,620	6,205
June	11,347*	25,597	10,616*
July	4,332	4,140	4,338
August	3,924	6,722	6,273
September	2,337	3,057	8,351
October	3,621	8,741	9,575
November	....	3,986	6,180
December	....	14,180*	22,548*
Totals	....	$154,881	$99,659

†Includes electric, fuel-fired, and all other types.

*Includes steel mill orders for six months as follows: June, 1955—$4,804,000; December, 1955—$11,443,000; June, 1956—$20,849,000; December, 1956—$8,322,000; June, 1957—$8,373,000.

Industrial Heating Equipment Association Inc.

Induction and Dielectric Heating Equipment

Net New Orders—Thousands

	1957	1956	1955
January	$1,110	$1,221	$1,031
February	1,675	918	966
March	1,053	1,221	1,417
April	635	1,456	760
May	949	1,510	1,559
June	747	961	1,365
July	1,335	996	1,417
August	1,350	1,030	1,759
September	487	1,650	1,108
October	385	1,468	963
November	....	1,477	1,841
December	....	1,093	2,134
Totals	....	$14,840	$16,320

Industrial Heating Equipment Association Inc.

Machinery & Equipment

METALWORKING FACTS AND FIGURES

Ball Bearings and Parts

(Imports)

1957	lb	Value
9 Mo.	338,865	$840,695
1956	538,535	1,056,664
1955†	1,169,243	2,346,333
1954†	376,397	576,383
1953	808,641	1,090,100
1952	928,940	1,453,539
1951	843,706	1,541,301
1950	85,027	156,496
1949	12,349	47,979
1948	14,396	55,091
1947	15,973	39,426

Roller Bearings and Parts

(Imports)

1957	lb	Value
9 Mo.	537,166	$1,201,681
1956	409,649	915,555
1955†	475,389	926,816
1954†	278,099	463,077
1953	881,330	1,307,201
1952	899,189	1,289,746
1951	901,351	1,244,019
1950	88,622	117,673
1949	14,464	38,955
1948	59,538	127,680
1947	40,432	67,144

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†Does not include shipments valued at less than $250.

Foreign Trade Division, U. S. Bureau of the Census.

Resistance Welding Equipment

1957	Value of Factory Shipments	Net New Orders
January	$3,160,816	$3,310,319
February	2,386,288	4,160,859
March	2,845,033	2,360,439
April	3,111,150	2,429,178
May	2,890,753	2,340,114
June	2,734,704	1,936,314
July	3,194,281	1,943,050
August	2,590,959	1,501,108
September	2,527,562	1,462,984
October	1,952,746	2,098,108
November	....	....
December	....	....
1956	$48,340,599	n.a.
1955	30,965,069	n.a.
1954	21,993,980	n.a.
1953	23,993,996	n.a.

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n.a.=not available.

Resistance Welder Manufacturers' Association.

Used Machine Tool Sales

Index—1947-49=100

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
1957	155.4	140.6	119.3	....
1956	148.6	134.4	119.3	149.4
1955	103.1	109.3	120.9	127.2
1954	110.8	106.8	93.7	86.5
1953	149.1	137.7	118.3	115.3

ANNUAL AVERAGES

1956	137.9	1953	130.1
1955	115.1	1952	147.5
1954	99.5	1951	179.4

Machinery Dealers National Association.

Contract Stampings Shipments

Index—1947-49=100

1957

Jan.	174	May	156	Sept.	123
Feb.	178	June	156	Oct.	151
Mar.	198	July	141	Nov.	...
Apr.	173	Aug.	116	Dec.	...

1956

Jan.	195	May	185	Sept.	155
Feb.	167	June	146	Oct.	180
Mar.	191	July	120	Nov.	165
Apr.	165	Aug.	163	Dec.	149

YEARLY AVERAGES

1957 (10 Mo.)	157	1956	165

Pressed Metal Institute.

WELDING ELECTRODES

Shipments in Pounds

1957	Mild Steel	Alloy	Nonferrous	Total
9 Mo.	349,029,476	38,590,341	1,391,372	389,011,189
1956	471,091,044	85,997,814	2,259,929	559,348,787
1955	409,203,615	71,797,359	1,638,701	482,639,675
1954	324,260,613	52,781,433	1,340,081	378,382,127
1953	409,437,791	76,049,553	1,889,653	487,376,997
1952	425,290,499	82,633,922	1,519,208	509,443,629
1951	413,444,913	65,903,970	1,361,836	480,710,719
1950	322,954,832	42,574,710	1,861,686	367,391,228
1949	273,463,740	24,753,807	1,715,362	299,932,909
1948	369,019,831	30,214,928	2,124,496	401,359,255
1947	307,756,495	25,172,382	2,149,768	335,078,645
1946	284,126,356	24,991,208†	....	309,117,564
1945	435,789,217	59,029,938†	....	494,819,155
1944	707,756,964	69,236,137†	....	776,993,101

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†Includes both alloy and nonferrous electrodes.

National Electrical Manufacturers Association.

ARC WELDING SETS

Units Ordered, Excluding Exports

	Single Operator, Variable Voltage, DC Sets			Transformer Welders	
1957	Motor Drive	Engine Drive	Generators Only	Industrial Type	Limited Input Type
9 Mo.	16,396	7,750	177	9,037	11,036
1956	21,955	11,054	189	15,970	13,853
1955	17,102	9,160	260	13,965	14,041
1954	12,817	7,450	340	12,220	10,310
1953	16,362	9,673	435	13,009	10,595
1952	18,932†	11,104	227	16,794	18,489
1951	13,048†	10,333	485	15,645	16,954
1950	10,115†	8,207	272	9,652	16,674
1949	7,393†	6,193	256	7,295	12,647
1948	10,927†	10,435	385	8,792	13,690
1947	13,677†	10,882	1,169	9,719	13,034
1946	16,467†	10,622	2,818	21,093	16,949
1945	20,716†	8,776	2,795	21,448	
1944	30,230†	6,023	3,140	15,426	

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†Does not include rectifier type.

National Electrical Manufacturers Association.

INTERNAL COMBUSTION ENGINES

Factory Shipments

Gasoline Engines (Except Automotive, Aircraft, and Miniature)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms	
			Number Engines	Value (Thousands)
1956	5,883,349	828,310	5,055,039	$237,465
1955	4,932,259	914,411	4,017,848	216,130
1954	3,669,505	675,930	2,993,575	179,323
1953	2,989,175	783,211	2,205,964	171,289
1952	2,945,050	719,436	2,225,614	188,647
1951	3,103,551	931,285	2,172,266	183,877

Diesel Engines (Except Automotive)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms	
			Number Engines	Value (Thousands)
1956	140,814	84,352	56,462	$214,830
1955	139,231	78,453	60,778	191,612
1954	104,686	56,047	48,639	172,271
1953	117,628	59,075	58,553	232,488
1952	120,538	56,660	63,878	184,585
1951	129,203	62,653	66,550	166,377

Gas Engines (Except Automotive, Aircraft, Outboard, and Miniature)

	Total Engines Produced	No. Used in Own Product	Shipped to Other Firms	
			Number Engines	Value (Thousands)
1956	20,472	11,183	9,289	$47,196
1955	18,038	10,138	7,900	34,179
1954	10,691	4,501	6,190	25,993

Outboard Motors

	Number	Value (Thousands)		Number	Value (Thousands)
1956	641,527	$150,388	1952	337,419	$46,129
1955	514,728	101,553	1951	291,697	39,456
1954	479,350	76,039	1950	367,173	41,037
1953	467,584	67,489	1947	584,458	50,038

U. S. Bureau of the Census.

Appliances

METALWORKING FACTS AND FIGURES

Floor and Wall Furnaces

Factory Shipments

	1957		1956	
	Number of Units	Value, Thousands of Dollars	Number of Units	Value, Thousands of Dollars
Jan. ..	29,888	1,970	32,523	2,211
Feb. ..	30,553	2,127	29,251	1,946
Mar. ..	26,911	1,794	33,794	2,312
Apr. ..	29,347	2,060	31,522	2,033
May ..	26,151	1,816	34,116	2,283
June ..	27,904	1,870	34,847	2,227
July ..	32,369	2,141	39,191	2,560
Aug ..	38,630	2,623	47,675	3,288
Sept. .	53,499	3,779	53,876	3,860
Oct. ..	.....	....	60,069	4,159
Nov. ..	.....	....	43,119	2,856
Dec. ..	.....	....	28,361	1,864
Totals	.....	....	468,344	31,599

YEARLY TOTALS

	Number of Units	Value, Thousands of Dollars
1955	556,900	36,368
1954	549,894	35,699
1953	551,614	36,198

U. S. Bureau of the Census.

Oil Burners

(Units sold separately)

1957	Residential	Commercial, Industrial	Total
9 Mo. ..	292,926	28,055	320,981
Jan.	29,592	2,898	32,490
Feb.	26,633	2,642	29,275
Mar.	26,232	2,926	29,158
Apr.	29,744	3,120	32,864
May	29,662	2,977	32,639
June	33,929	2,984	36,913
July	33,553	2,910	36,463
Aug.	40,390	3,672	44,062
Sept.	43,191	3,926	47,117
Oct.	.....	....	.....
Nov.	......	....	......
Dec.	.....	....	.....

YEARLY TOTALS

	Residential	Commercial, Industrial	Total
1956	455,835	36,813	492,648
1955	536,234	36,849	573,083
1954	494,259	34,321	528,580
1953	540,774	38,922	579,696
1952	504,557	34,436	538,993

U. S. Bureau of the Census.

Oil Cooking Stoves

(Kerosine, Gasoline, and Fuel Oil)

Shipments—Units

	1957	1956	1955	1954
Jan.	5,934	8,835	9,123	8,946
Feb.	6,950	9,473	8,343	8,437
Mar.	11,027	8,016	8,902	9,422
Apr.	6,954	8,733	9,920	8,313
May	7,649	7,283	7,840	9,229
June	5,656	6,206	7,892	8,932
July	5,880	4,815	5,427	6,582
Aug.	9,278	11,839	12,471	9,676
Sept.	7,094	7,673	12,182	10,184
Oct.		8,512	12,039	11,652
Nov.		5,858	8,268	9,127
Dec.		5,352	8,062	8,773

YEARLY TOTALS

1956	92,595	1954	109,273	1952	119,928
1955	110,469	1953	111,479	1951	132,833

U. S. Bureau of the Census.

Coal and Wood Cooking Stoves

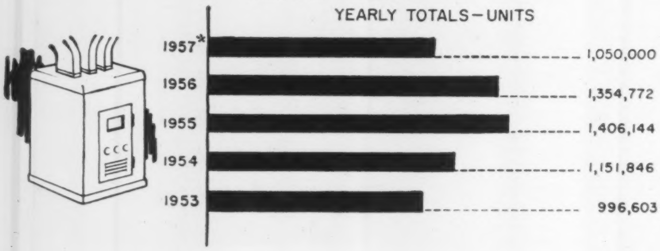
Shipments—Units

	1957	1956	1955	1954
Jan.	4,178	5,084	5,564	4,683
Feb.	4,716	5,039	5,527	6,110
Mar.	4,000	4,958	6,063	5,643
Apr.	4,716	4,572	4,283	5,876
May	4,669	4,159	4,107	3,468
June	4,757	4,154	4,817	4,206
July	3,908	4,065	5,367	4,351
Aug.	4,497	7,183	6,460	6,294
Sept.	5,451	5,789	7,752	7,708
Oct.	....	6,536	6,834	7,320
Nov.	....	5,537	7,053	6,652
Dec.	....	4,387	6,476	5,586
Totals		61,463	70,303	67,897

U. S. Bureau of the Census.

WARM AIR FURNACES

(Cast Iron and Steel)



SHIPMENTS

	1957		1956	
	Number of Units	Value, Thousands of Dollars	Number of Units	Value, Thousands of Dollars
Jan.	75,731	14,540	93,780	18,042
Feb.	66,838	12,794	84,574	16,095
Mar.	70,318	13,276	90,982	17,252
Apr.	74,084	13,998	91,100	17,071
May	73,906	13,436	100,312	18,349
June	84,651	14,991	111,653	21,157
July	85,681	15,934	119,629	22,812
Aug.	114,756	21,836	171,168	33,360
Sept.	140,797	27,021	165,585	32,387
Oct.	......	.....	142,878	28,230
Nov.	......	.....	106,685	21,251
Dec.	......	.....	76,426	14,688
Totals	......	.....	1,354,772	260,694

Yearly Totals	Number of Units	Value, in Dollars
1955	1,406,144	263,865,000
1954	1,151,846	222,500,000
1953	996,603	197,275,000
1952	927,699	187,987,000
1951	871,527	180,848,000
1950	1,099,734	205,484,000

U. S. Bureau of the Census.

*Estimated.

Forced Air Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1957				
9 Mo.	8,541	240,745	497,364	746,650
Jan.	678	23,530	47,252	71,460
Feb.	432	20,605	41,956	62,993
Mar.	551	21,304	48,463	70,318
Apr.	485	21,604	48,303	70,392
May	544	21,788	48,381	70,713
June	818	25,362	54,213	80,393
July	933	24,192	55,331	80,456
Aug.	1,736	37,344	68,778	107,858
Sept.	2,364	45,016	84,687	132,067
Oct.	......	......	......	......
Nov.	......	......	......	......
Dec.	......	......	......	
1956	14,535	395,066	776,734	1,186,335
Jan.	768	27,544	54,094	82,406
Feb.	569	25,177	48,758	74,504
Mar.	460	26,053	54,261	80,774
Apr.	427	25,069	55,322	80,818
May	890	26,294	61,122	88,306
June	1,056	30,156	67,857	99,069
July	1,483	34,492	69,145	105,120
Aug.	2,432	52,207	95,081	149,720
Sept.	2,516	50,886	89,078	142,480
Oct.	1,767	44,376	76,931	123,074
Nov.	1,404	31,840	59,581	92,825
Dec.	763	20,972	45,504	67,239
1955	14,872	449,863	793,410	1,258,145
1954	13,748	413,277	597,017	1,024,042
1953	16,280	403,207	443,510	862,997
1952	21,262	345,433	398,889	765,584

U. S. Bureau of the Census.

Gravity Air-Flow Furnaces

Shipments—Number of Units

	Solid Fuel	Oil	Gas	Total
1957				
9 Mo.	20,101	2,512	21,789	44,402
Jan.	2,088	207	1,976	4,271
Feb.	1,828	265	1,752	3,845
Mar.	1,487	236	2,567	4,290
Apr.	1,681	189	1,822	3,692
May	1,208	158	1,827	3,193
June	1,727	165	2,366	4,258
July	2,525	258	2,442	5,225
Aug.	3,250	552	3,096	6,898
Sept.	4,307	482	3,941	8,730
Oct.	.....	.....	.....	.....
Nov.	.....	.....	.....	.....
Dec.	.....	.....	.....	.....
1956	35,580	4,723	37,392	77,695
Jan.	2,088	315	2,688	5,091
Feb.	1,895	240	2,267	4,402
Mar.	1,615	227	2,266	4,108
Apr.	1,864	242	2,068	4,174
May	2,364	291	2,629	5,284
June	2,473	278	2,347	5,098
July	3,399	278	2,817	6,494
Aug.	4,687	666	4,631	9,984
Sept.	5,510	752	5,767	12,029
Oct.	4,974	742	4,531	10,247
Nov.	2,849	463	3,406	6,718
Dec.	1,862	229	1,975	4,066
1955	39,608	6,172	44,237	90,017
1954	37,285	11,938	58,617	107,840
1953	55,625	17,874	60,107	133,606
1952	79,231	18,033	64,851	162,115

U. S. Bureau of the Census.

Cast Iron Radiators and Convectors

Shipments in thousands of square feet of radiation

	1957	1956	1955
January	1.712	2.018	1.675
February	1.797	2.236	1.970
March	1.803	1.802	2.419
April	1.723	1.900	2.035
May	1.507	1.577	1.732
June	2.230	1.618	2.208
July	1.769	1.959	1.865
August	2.123	2.996	3.615
September	2.551	3.089	3.326
October	....	3.719	3.115
November	....	2.589	2.779
December	....	1.756	1.773
Totals	....	27,259	28,512

YEARLY TOTALS

1954	28.386	1952	36.898
1953	31.667	1951	42,512

U. S. Bureau of the Census.

Plumbing Fixtures

Shipments—Value in Thousands

VITREOUS CHINA AND GLAZED EARTHENWARE

Qtr.	1957	1956	1955	1954
1st	$32.124	$38.300	$31.102	$26.078
2nd	34.173	38.760	34.415	26.062
3rd	34.029	36.764	35.810	27.532
4th	.....	33.027	36.350	30.164
Totals	.....	$146.851	$137.677	$109.836

1953	$91,047	1951	$108.243
1952	85.230	1950	102.332

ALL METAL—EXCLUSIVE OF FITTINGS

Qtr.	1957	1956	1955	1954
1st	$44.639	$50.857	$55.840	$44.333
2nd	47.990	51.328	59.758	47.029
3rd	43.797	54.423	60.038	53.285
4th	.....	42.087	49.714	52.057
Totals	.....	$198.695	$225.350	$196.704

1953	$186.690	1951	$202.530
1952	176.136	1950	212.675

CAST IRON

Qtr.	1957	1956	1955	1954
1st	$30.040	$33.881	$37.517	$30.560
2nd	31.803	34.175	39.397	29.744
3rd	27.197	35.511	39.403	35.454
4th	.....	27.392	32.200	35.063
Totals	.....	$130.959	$148.517	$130.821

1953	$125.239	1951	$141.920
1952	119.654	1950	144.527

STEEL

Qtr.	1957	1956	1955	1954
1st	$14.380	$16.763	$18.082	$13.650
2nd	15.979	16.886	20.140	17.150
3rd	16.407	18.667	20.421	17.688
4th	.....	14.490	17.353	16.883
Totals	.....	$66.806	$75.996	$65.371

1953	$60.587	1951	$59.404
1952	55.586	1950	65.850

ALUMINUM, MONEL & OTHER METAL

Qtr.	1957	1956	1955	1954
1st	$219	$213	$241	$123
2nd	208	267	221	135
3rd	193	245	214	143
4th	...	205	161	111
Totals	...	$930	$837	$512

1953	$864	1951	$1,206
1952	896	1950	2,298

U. S. Bureau of the Census.

Domestic Heating Stoves

Shipments

	Coal, Wood†	Gas	Oil‡	Total
1957				
9 Mo.	191.288	911.775	100.711	1.533.774
Jan.	6.379	56.564	26.912	89.855
Feb.	8.021	55.660	27.035	90.716
Mar.	9.870	54.011	41.160	105.041
Apr.	14.232	55.323	34.030	103.585
May	17.406	78.250	47.700	143.356
June	22.674	106.523	31.924	161.121
July	30.686	141.644	55.911	228.241
Aug.	38.676	187.472	71.058	297.206
Sept.	43.344	206.328	64.981	314.653
Oct.	......	......	......	......
Nov.	......	......	......	......
Dec.	......	......	......	......
1956	335.362	1,532.157	647.537	2,515.056
Jan.	6.896	57.044	26.815	90.755
Feb.	10,245	58.849	37.199	106.293
Mar.	10,636	76.970	43.628	131.234
Apr.	14.310	71.694	39.576	125.580
May	18.511	99.159	48.497	166.167
June	24,269	132.474	49.894	206.637
July	32.832	183.315	64.470	280.617
Aug.	54.526	215.861	78.258	348.645
Sept.	58.212	195.533	93.943	347.688
Oct.	63.483	224.507	95.592	383.582
Nov.	30.905	160.611	50.806	242.322
Dec.	10.537	56.140	18.859	85.536

YEARLY TOTALS

1955	311.167	1.469.688	636.430	2.417.285
1954	271.197	1.387.517	661.125	2.319.839
1953	331.601	1.674.161	972.919	2.978.681

† Excludes sheet metal, airtight type.
‡ Includes kerosine stoves.
U. S. Bureau of the Census.

Electric Lamps (Bulbs)

Manufacturers' Shipments
Value in Thousands of Dollars

	Domestic	Export	Total
1957 (9 Mo.)	276.312	14.214	290.526
1956	356.639	15.796	372.435
1955	323.172	14.254	337.426
1954	290.618	11.439	302.059
1953	277.529	11.819	289.348
1952	229.899	8.206	238.105
1951	252.465	11.670	264.135
1950	233.860	9,297	243.157

PRODUCTION

Thousands of Lamps

1957 (9 Mo.)	2.100.642	1953	2.247.700
1956	2.717.945	1952	n.a.
1955	2.484.613	1951	2.341.154
1954	2.246.746	1950	2.084.607

n.a. = not available.
U. S. Bureau of the Census.

Receiving Tubes

(Manufacturers' Sales)

	Number	Value
1957 (10 Mo.)	388.738.000	$326.355.000
January	37.571.000	31.170.000
February	44.460.000	36.631.000
March	43.010.000	37.007.000
April	27.970.000	25.384.000
May	32.836.000	28.955.000
June	35.328.000	31.314.000
July	33.077.000	27.042.000
August	43.029.000	34.886.000
September	44.382.000	35.545.000
October	47.075.000	38.421.000
November	....	....
December	....	....
1956	464.186.000	$374.186.000
1955	479.802.000	358,110.000

Electronic Industries Association.

Television Picture Tubes

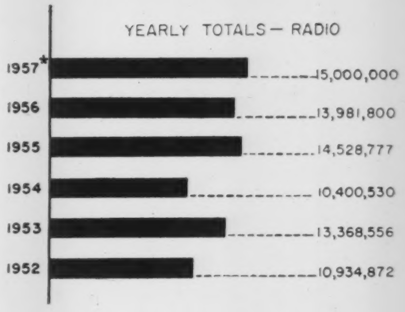
(Manufacturers' Sales)

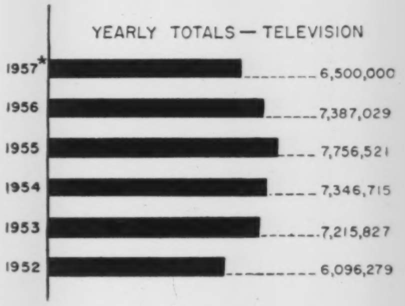
	Number	Value
1957 (10 Mo.)	8.304.181	$155.121.412
January	760.860	13.594.525
February	728.363	13.134.778
March	833.257	14.850.847
April	629.838	11.394,043
May	758.328	14.031.519
June	1.104.013	19.981.319
July	491,935	9.835,586
August	930.296	17.984.185
September	1.071.662	20.819,036
October	995,629	19.495,574
November	....	....
December	....	....
1956	10.987,021	$196.220.240
1955	10.874,234	209,007,518

Electronic Industries Association.

RADIO AND TELEVISION RECEIVERS

Number Produced





RADIOS

	Automobile	Other	Total
1957			
10 Mo.	4.362,091	7,583.433	11,945,534
January	521,624	563,905	1,085,529
February	522,859	741,906	1,264,765
March	597,532	1,011,541	1,609,073
April	380,452	735,361	1,115,813
May	396,151	627,620	1,023,771
June	416,058	672,285	1,088,343
July	256,279	356,309	612,588
August	301,971	663,753	965,724
September	446,419	1,164,329	1,610,748
October	522,746	1,046,434	1,569,180
November	....	....	....
December	....	....	....

YEARLY TOTALS

	Units	Value (Manufacturers')
1956	13,981,800	$298,372,000
1955	14,528,777	291,157,000
1954	10,400,530	228,812,000
1953	13,368,556	297,985,000
1952	10,934,872	249,847,000
1951	12,627,362	315,936,597

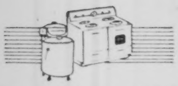
TELEVISION

	1957	1956	1955
January	450,190	558,347	654,582
February	464,697	576,282	702,514
March	559,842	680,003	831,156
April	361,246	549,632	583,174
May	342,386	467,913	467,394
June	543,778	553,025	589,973
July	360,660	336,931	344,295
August	673,734	612,927	647,903
September	832,631	894,211	939,515
October	661,994	820,781	759,735
November	......	679,993	631,654
December	......	626,984	604,626

YEARLY TOTALS

	Units	Value (Manufacturers')
1956	7,387,029	$938,596,000
1955	7,756,521	1,071,020,000
1954	7,346,715	1,028,540,000
1953	7,215,827	1,230,298,000
1952	6,096,279	1,049,000,000
1951	5,384,798	956,986,300

*Estimated.
Electronic Industries Association.



Appliances

METALWORKING FACTS AND FIGURES

Electric Disc Stoves and Hot Plates

(1650 Watts or Less)
Sales Billed—Units

	1957	1956	1955	1954
Jan.	.....	17,485	23,679	37,545
Feb.	.....	24,801	30,214	41,796
Mar.	.....	27,087	30,853	27,165
Apr.	.....	27,738	22,930	20,807
May	.....	28,622	29,018	24,022
June	.....	24,151	27,722	22,412
July	.....	20,740	31,569	28,136
Aug.	.....	39,967	42,220	48,891
8 Mo.	210,293	.....	.....	.....
Sept.	.....	43,500	48,028	42,719
Oct.	.....	n.a.	41,460	33,254
Nov.	.....	n.a.	30,884	33,487
Dec.	.....	n.a.	29,656	16,885
Totals	.....	352,881	388,233	377,119

n.a.=not available.
National Electrical Manufacturers Association.

Portable Electric Air Heaters

Sales Billed—Units

CONVECTOR AND RADIANT

	1957	1956	1955	1954
Jan.	.....	6,550	2,579	3,905
Feb.	.....	6,343	2,114	1,487
Mar.	.....	572	939	461
Apr.	.....	894	915	209
May	.....	401	1,228	1,750
June	.....	2,157	1,458	1,285
July	.....	7,231	8,257	5,312
Aug.	.....	21,666	16,940	25,338
8 Mo.	41,364	.....	.....	.....
Sept.	.....	27,654	33,718	36,238
Oct.	.....	n.a.	25,439	27,236
Nov.	.....	n.a.	15,874	19,655
Dec.	.....	n.a.	9,048	6,454
Totals	.....	117,113	118,509	129,330

FAN FORCED AND
FAN AND HEATER COMBINATION

	1957	1956	1955	1954
Jan.	.....	28,841	16,690	24,705
Feb.	.....	13,737	11,863	11,001
Mar.	.....	6,933	4,113	6,106
Apr.	.....	4,589	4,515	4,688
May	.....	21,967	25,556	16,874
June	.....	32,580	34,799	15,234
July	.....	34,151	53,499	40,057
Aug.	.....	90,703	82,070	105,080
8 Mo.	218,809	.....	.....	.....
Sept.	.....	175,572	129,677	110,647
Oct.	.....	n.a.	106,930	92,520
Nov.	.....	n.a.	107,189	79,419
Dec.	.....	n.a.	69,889	39,429
Totals	.....	729,543	646,790	545,760

n.a.=not available.
National Electrical Manufacturers Association.

Electric Coffeemakers, Pots & Urns

Vacuum (glass & metal) and Percolators
Sales Billed—Units

	1957	1956	1955	1954
Jan.	......	242,506	151,449	200,967
Feb.	......	253,876	170,448	221,829
Mar.	......	206,543	265,929	207,866
Apr.	......	206,807	122,218	182,575
May	......	218,349	137,713	185,773
June	......	250,543	170,498	205,540
July	......	222,296	185,046	182,922
Aug.	......	411,273	251,419	249,581
8 Mo.	1,740,838	......	......	......
Sept.	......	449,631	413,961	323,760
Oct.	......	n.a.	383,012	378,822
Nov.	......	n.a.	339,348	256,348
Dec.	......	n.a.	275,382	193,571
Totals	......	3,453,684	2,866,423	2,789,554

n.a.=not available.
National Electrical Manufacturers Association.

Electric Grills and Waffle Irons

Sales Billed—Units

Sandwich Grills & Griddles, Waffle Irons, & Combination Grills & Waffle Irons

	1957	1956	1955
Jan.	.....	38,145	57,126
Feb.	.....	49,731	55,904
Mar.	.....	60,213	51,896
Apr.	.....	24,312	52,073
May	.....	23,777	28,143
June	.....	44,294	33,858
July	.....	70,697	69,914
Aug.	.....	78,771	76,225
8 Mo.	341,376	.....	.....
Sept.	.....	85,618	107,570
Oct.	.....	n.a.	86,133
Nov.	.....	n.a.	78,330
Dec.	.....	n.a.	60,698
Totals	.....	699,268	757,870

n.a.=not available.
National Electrical Manufacturers Assn.

Electric Freezers†

(Home and Farm)
Sales Billed—Units

	1957	1956	1955	1954
Jan.	68,400	77,800	56,672	49,017
Feb.	73,400	83,700	61,000	50,594
Mar.	81,400	85,300	63,631	52,114
Apr.	70,900	95,300	58,473	64,297
May	82,300	83,000	57,618	59,728
June	94,800	93,000	77,527	76,819
July	109,100	105,000	72,706	61,145
Aug.	86,000	93,800	58,445	57,509
Sept.	79,000	79,100	72,987	63,268
Oct.	.....	67,200	57,016	53,330
Nov.	.....	54,400	44,353	40,321
Dec.	..	57,400	44,026	40,746
Totals	.....	975,000	724,454	668,888

†From 1956 forward, figures are expanded to cover total industry sales.
National Electrical Manufacturers Association.

Deep Fat Fryers

Sales Billed—Units

	1957	1956	1955
Jan.	.....	9,535	16,979
Feb.	.....	10,053	19,302
Mar.	.....	8,848	12,197
Apr.	.....	6,155	9,019
May	.....	4,808	12,544
June	.....	6,264	11,085
July	.....	10,632	19,883
Aug.	.....	9,569	18,684
8 Mo.	47,440	.....	.....
Sept.	.....	9,161	36,421
Oct.	.....	n.a.	18,154
Nov.	.....	n.a.	10,478
Dec.	.....	n.a.	—(710)*
Totals	.....	101,266	184,036

*Represents bookkeeping adjustment at year-end.
n.a.=not available.
National Electrical Manufacturers Association.

Steel Kitchen Cabinets

(Including steel cabinet sink units)
(Factory Sales)

	Units	Retail Value
1957	2,490,000	$150,120,000
1956	3,641,000	188,395,000
1955	4,046,000	209,328,000
1954	3,372,000	174,440,000
1953	3,441,000	178,000,000
1952	2,970,000	154,000,000
1951	2,871,000	128,850,500

Steel Kitchen Cabinet Manufacturers Assn. Inc.

Electric Toasters

Sales Billed—Units

AUTOMATIC

	1957	1956	1955	1954
Jan.	.....	120,420	156,967	119,972
Feb.	.....	131,940	132,864	115,732
Mar.	.....	174,013	126,824	97,883
Apr.	.....	138,077	92,281	76,833
May	.....	125,595	101,970	81,400
June	.....	214,086	185,028	118,171
July	.....	281,140	241,794	209,360
Aug.	.....	272,223	338,797	310,476
8 Mo.	1,227,697	......	......	......
Sept.	.....	279,828	270,346	318,845
Oct.	.....	n.a.	240,448	306,878
Nov.	.....	n.a.	288,809	258,171
Dec.	.....	n.a.	169,189	142,685
Totals	.....	2,590,485	2,345,816	2,156,406

NONAUTOMATIC

	1957	1956	1955	1954
Jan.	.....	14,763	14,739	21,889
Feb.	.....	14,484	10,411	15,324
Mar.	.....	17,738	15,502	12,323
Apr.	.....	12,974	14,749	10,391
May	.....	11,700	14,034	13,683
June	.....	12,934	12,720	18,466
July	.....	14,375	12,530	14,495
Aug.	.....	28,009	21,598	19,935
8 Mo.	109,753	.....	.....	.....
Sept.	.....	23,768	17,330	37,110
Oct.	.....	n.a.	17,966	37,791
Nov.	.....	n.a.	21,929	19,884
Dec.	.....	n.a.	20,660	13,371
Totals	.....	200,241	194,168	234,662

n.a.=not available.
National Electrical Manufacturers Association.

Standard-Size Ironers

Factory Sales—Units

	1957	1956	1955	1954
Jan.	4,392	4,963	8,648	9,792
Feb.	3,784	4,516	8,241	8,208
Mar.	3,308	4,809	7,750	6,025
Apr.	3,249	4,753	6,050	8,388
May	2,865	4,222	6,558	7,210
June	3,537	3,607	6,017	5,185
July	1,682	3,570	4,861	5,227
Aug.	3,475	4,857	6,005	5,925
Sept.	4,203	5,748	9,014	8,905
Oct.	4,336	5,776	7,409	9,021
Nov.	....	5,987	6,943	6,427
Dec.	....	5,685	4,414	5,892
Totals	....	58,493	81,910	86,205

American Home Laundry Manufacturers' Assn.

Electric Corn Poppers

Sales Billed—Units

1957 (8 Mo.)	179,121	1955	492,909
1956	516,590	1954	525,198

National Electrical Manufacturers Association.

Electric Skillets

Sales Billed—Units

1957 (8 Mo.)	970,819	1956	2,027,019

National Electrical Manufacturers Association.

Electric Dishwashers

Total Industry Sales

1957 (9 Mo.)	292,100	1954	215,000
1956	400,000	1953	180,000
1955	295,000	1952	175,000

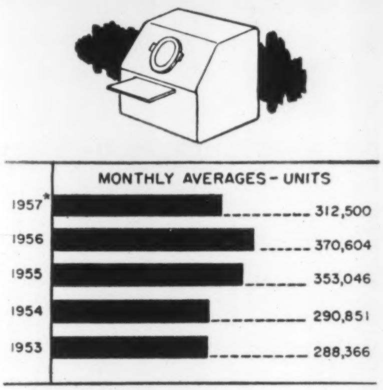
National Electrical Manufacturers Association.

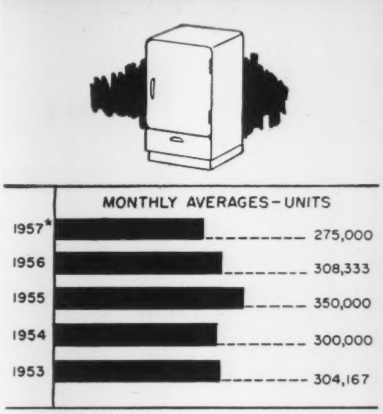
Electric Food Waste Disposers

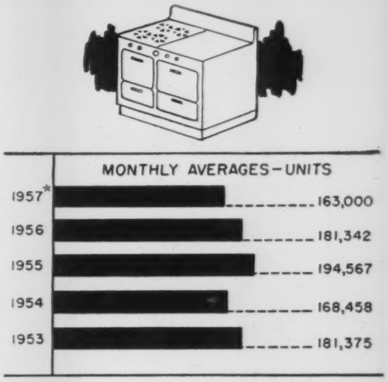
Total Industry Sales

1957 (9 Mo.)	397,100	1954	410,000
1956	590,000	1953	325,000
1955	520,000	1952	260,000

National Electrical Manufacturers Association.







WASHERS

Sales Billed—Units

	1957†	1956	1955
Jan.	331,314	393,717	357,354
Feb.	319,580	405,631	353,214
Mar.	286,205	405,744	370,555
Apr.	230,675	324,238	313,461
May	254,195	315,249	341,759
June	282,289	340,235	354,470
July	335,139	380,172	245,879
Aug.	329,046	373,925	403,770
Sept.	384,299	402,631	414,914
Oct.	......	449,409	362,335
Nov.	......	357,935	361,341
Dec.	......	298,368	357,503

YEARLY TOTALS

1956....	4,447,254	1953....	3,460,396
1955....	4,236,555	1952....	3,174,588
1954....	3,490,212	1951....	3,327,236

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*Estimated.

†Excluding combination washer-dryers.

American Home Laundry Manufacturers' Association.

ELECTRIC REFRIGERATORS†

Sales Billed—Units

	1957	1956	1955
Jan.	305,400	308,900	361,981
Feb.	298,700	316,000	318,812
Mar.	309,300	403,500	359,574
Apr.	281,600	353,300	327,700
May	303,700	346,800	354,837
June	305,100	354,400	358,798
July	318,000	351,000	301,638
Aug.	240,500	307,600	291,376
Sept.	265,200	277,300	289,623
Oct.	......	212,200	216,820
Nov.	......	211,600	217,364
Dec.	......	257,400	286,643

YEARLY TOTALS

1956....	3,700,000	1952....	3,570,000
1955....	4,200,000	1951....	4,075,000
1954....	3,600,000	1950....	6,200,000
1953....	3,650,000	1949....	4,450,000

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*Estimated.

†Monthly figures for 1956 and 1957 and all annual totals have been expanded to cover total industry sales.

National Electrical Manufacturers Association.

HOUSEHOLD GAS RANGES†

Shipments—Units

	1957	1956	1955
Jan.	149,600	163,500	155,500
Feb.	161,600	190,200	189,700
Mar.	179,400	194,300	220,500
Apr.	168,800	176,300	188,200
May	156,200	179,400	193,200
June	155,300	185,100	210,800
July	137,400	158,800	150,900
Aug.	182,600	203,200	227,900
Sept.	192,100	206,400	224,100
Oct.	199,300	219,100	217,600
Nov.	......	161,100	192,400
Dec.	......	138,700	164,000

YEARLY TOTALS

1956....	2,176,100	1953....	2,176,500
1955....	2,334,800	1952....	2,188,900
1954....	2,021,500	1951....	2,358,600

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*Estimated.

†Figures prior to 1955 include free-standing ranges only.

Gas Appliance Manufacturers Association Inc.

Automatic Tumbler Dryers

Factory Sales—Units

	1957	1956	1955	1954
Jan. ...	144,621	166,243	115,383	82,195
Feb. ...	114,517	148,522	109,215	62,488
Mar. ...	83,668	113,031	113,498	54,796
Apr. ...	42,850	64,923	73,978	37,661
May ...	31,572	55,330	49,228	26,533
June ...	46,783	58,441	70,616	30,297
July ...	70,011	117,548	60,516	40,755
Aug. ...	116,601	144,537	136,190	80,165
Sept. ...	164,468	192,724	169,905	107,084
Oct. ...	......	206,929	166,889	122,182
Nov. ...	......	170,529	157,153	138,254
Dec. ...	......	162,953	161,823	115,341
Totals	......	1,601,710	1,384,394	897,751

American Home Laundry Manufacturers' Association.

Household Electric Ranges†

Sales Billed—Units

	1957	1956	1955
Jan.	144,500	143,600	134,782
Feb.	127,700	161,400	125,351
Mar.	139,400	163,100	127,298
Apr.	107,200	157,500	105,566
May	93,600	128,400	106,199
June	102,300	129,800	102,430
July	88,700	121,500	83,652
Aug.	85,800	97,500	72,304
Sept.	124,800	129,300	98,345
Oct.	......	116,200	101,370
Nov.	......	110,200	86,429
Dec.	......	126,500	115,910

YEARLY TOTALS

1956......	1,585,000	1951......	1,400,000
1955......	1,600,000	1950......	1,830,000
1954......	1,350,000	1949......	1,056,000
1953......	1,250,000	1948......	1,600,000
1952......	1,060,000	1947......	1,210,000

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†Monthly figures for 1956 and 1957 and all annual totals have been expanded to cover total industry sales. Figures prior to 1956 include free-standing ranges only.

National Electrical Manufacturers Association.

Standard Vacuum Cleaners

Sales Billed—Units

	1957	1956	1955
Jan.	276,738	302,203	248,941
Feb.	300,887	286,386	261,183
Mar.	312,746	395,686	356,444
Apr.	281,627	352,873	241,870
May	231,246	326,008	255,941
June	207,286	248,326	239,728
July	218,276	259,774	206,758
Aug.	241,218	276,932	252,691
Sept.	302,869	320,278	306,507
Oct.	328,655	371,998	349,654
Nov.	......	300,381	307,267
Dec.	......	281,025	243,457

YEARLY TOTALS

1956......	3,721,870	1953......	2,777,756
1955......	3,270,441	1952......	2,841,803
1954......	2,658,136	1951......	2,729,104

Vacuum Cleaner Manufacturers' Association.

Gas Water Heaters

Shipments—Underfired and Sidearm Types

	1957		1956	
	Units	Value, Thousands of Dollars	Units	Value, Thousands of Dollars
Jan.	209,953	11,609	224,004	12,472
Feb.	202,173	11,501	246,098	13,364
Mar.	221,765	12,527	254,786	13,989
Apr.	232,705	13,066	230,056	12,178
May	228,198	12,649	231,388	12,397
June	205,838	11,177	236,758	12,856
July	188,082	10,196	226,532	11,972
Aug.	205,503	11,069	237,962	13,001
Sept.	215,600*	n.a.	217,277	11,634
Oct.	240,900*	n.a.	225,632	12,080
Nov.	......	.....	182,266	9,772
Dec.	......	.....	153,198	8,137

YEARLY TOTALS

	Units	Value
1956	2,665,957	$143,852,000
1955	2,596,636	140,976,000
1954	2,235,618	116,430,000

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*Gas Appliance Manufacturers Association Inc.

n.a.=not available.

All other figures, U. S. Bureau of the Census.

Electric Flat Irons

Sales Billed—Units

	1957	1956	1955
January	......	267,256	297,830
February ...	......	464,266	338,551
March	......	715,634	421,919
April	......	373,226	343,181
May	......	364,213	381,055
June	......	538,702	737,103
July	......	762,318	584,584
August	......	560,787	499,913
8 Mo.	3,249,974	......	......
September ..	......	682,341	781,010
October	......	n.a.	660,584
November ...	......	n.a.	559,606
December ...	......	n.a.	270,668
Totals	......	6,170,711	5,876,004

YEARLY TOTALS

1954......	5,441,229	1952......	5,255,044
1953......	6,444,730	1951......	6,012,727

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n.a.=not available.

National Electrical Manufacturers Association.

Electric Water Heaters†

Unit Sales of Storage Tank Type

	1957	1956	1955
January	56,300	72,300	47,067
February	62,600	79,100	57,063
March	66,200	79,900	63,829
April	65,600	80,500	58,105
May	71,500	79,500	63,143
June	70,500	82,100	69,729
July	64,000	75,300	58,246
August	60,500	68,300	53,046
September	69,800	75,400	65,591
October	.....	72,400	51,337
November	.....	54,400	36,140
December	.....	50,500	41,588

YEARLY TOTALS

1956.......	870,000	1952.......	720,000
1955.......	900,000	1951.......	845,000
1954.......	806,000	1950.......	990,000
1953.......	780,000	1949.......	695,000

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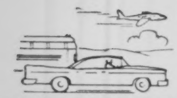
†Monthly figures for 1956 and 1957 and all annual totals have been expanded to cover total industry sales.

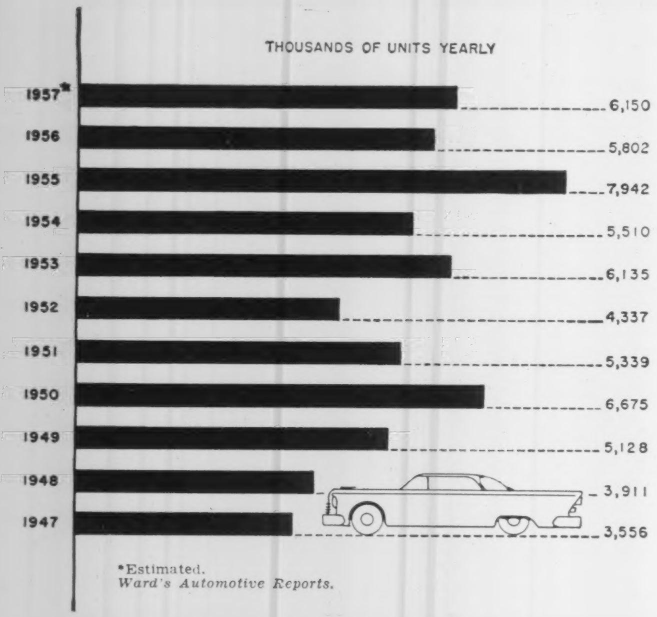
National Electrical Manufacturers Association.



Transportation

METALWORKING FACTS AND FIGURES

U. S. PASSENGER CAR PRODUCTION



TRUCKTRAILERS

	Production by Types									Shipments	
	Vans	Tanks	Pole, Pipe & Logging	Platforms	Low-Bed Heavy Haulers	Dump Trailers	All Other†	Trailer Chassis Only	Total Production, Units	Units	Value (000)
1957											
9 Mo.	22,631	4,347	834	8,136	2,297	1,526	2,779	3,383	45,933	46,869	$230,708
Jan.	2,625	526	101	846	212	180	293	249	5,032	4,964	24,994
Feb.	2,654	523	88	900	236	169	262	258	5,090	5,233	26,350
Mar.	2,608	582	155	1,023	336	203	356	292	5,555	5,457	27,261
Apr.	2,580	559	104	1,088	350	243	354	258	5,536	5,458	27,026
May	2,665	527	109	1,071	319	229	396	258	5,574	5,645	27,366
June	2,364	495	76	890	267	140	371	507	5,110	5,148	25,146
July	2,084	412	57	801	190	103	322	142	4,111	4,335	21,068
Aug.	2,529	353	72	850	214	116	188	936	5,258	5,809	26,972
Sept.	2,522	370	72	667	173	143	237	483	4,667	4,820	24,525
Oct.	....	...	...	...	...	...	...	...	....	....	.....
Nov.	....	...	...	...	...	...	...	...	....	....	.....
Dec.	....	...	...	...	...	...	...	...	....	....	.....
1956	39,254	6,584	1,886	11,524	3,115	2,238	2,879	3,660	71,140	67,824	$329,230
Jan.	3,822	501	143	939	256	133	293	147	6,234	4,856	23,268
Feb.	3,815	499	155	1,004	309	160	265	217	6,424	4,836	23,688
Mar.	3,797	559	186	1,125	305	245	270	379	6,866	6,659	31,326
Apr.	4,165	523	248	997	333	219	317	353	7,155	6,994	34,009
May	3,950	598	251	1,164	310	238	215	436	7,162	7,178	35,108
June	3,684	635	234	1,108	336	233	259	440	6,929	6,974	34,463
July	2,793	461	154	926	221	192	180	261	5,188	5,081	24,683
Aug.	3,253	630	146	968	265	201	188	349	6,000	5,780	27,939
Sept.	2,455	523	104	758	203	191	228	361	4,823	4,888	23,758
Oct.	2,918	558	125	869	203	191	229	355	5,448	5,438	26,230
Nov.	2,524	557	68	873	207	142	196	191	4,758	4,862	23,600
Dec.	2,078	540	72	793	167	93	239	171	4,153	4,278	21,158

YEARLY TOTALS

	Production, Units	Shipments			Production, Units	Shipments	
		Units	Value			Units	Value
1955........	77,987	76,468	$371,413,000	1952........	58,078	57,973	$228,378,000
1954........	55,399	54,537	245,227,000	1951........	67,384	64,691	245,315,000
1953........	97,102	96,699	294,849,000	1950........	64,617	65,966	229,685,000

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†Includes off-highway, auto transport, public utility trailers, and special trailers for Defense Department. U. S. Bureau of the Census.

U. S. Auto Production

	Passenger Cars	Trucks	Totals
1957*	6,150,000	1,077,629	7,227,629
Jan.	642,089	94,138	736,227
Feb.	571,098	92,467	663,565
Mar.	578,826	89,301	668,127
Apr.	549,239	104,762	654,001
May	531,365	100,780	632,145
June	500,271	92,546	592,817
July	495,629	93,870	589,499
Aug.	524,354	87,446	611,800
Sept.	284,265	58,442	342,707
Oct.	327,362	88,545	415,907
Nov.	578,601	90,332	668,933
Dec.* ...	566,901	85,000	651,901
1956	5,801,864	1,104,325	6,906,189
Jan.	612,078	106,034	718,112
Feb.	555,596	101,866	657,462
Mar.	575,260	105,205	680,465
Apr.	547,617	98,716	646,333
May	471,673	95,881	567,554
June	430,373	87,811	518,184
July	448,876	84,534	533,410
Aug.	402,575	90,432	493,007
Sept.	190,726	61,377	252,103
Oct.	389,061	95,438	484,499
Nov.	580,803	92,596	673,399
Dec.	597,226	84,435	681,661
1955	7,942,132	1,246,442	9,188,574
1954	5,509,550	1,022,609	6,532,159
1953	6,134,534	1,203,835	7,338,369
1952	4,337,481	1,218,045	5,555,526
1951	5,338,820	1,412,149	6,750,969
1950	6,674,933	1,344,227	8,019,160
1949	5,128,187	1,132,138	6,260,325
1948	3,910,700	1,369,472	5,280,172
1947	3,556,126	1,236,703	4,792,829

Canadian Auto Production

	Passenger Cars	Trucks	Totals
1957*	349,004	72,915	421,919
Jan.	38,184	6,796	44,980
Feb.	29,609	6,693	36,302
Mar.	38,045	6,870	44,915
Apr.	40,505	8,309	48,814
May	39,772	8,890	48,662
June	32,022	7,015	39,037
July	29,603	5,730	35,333
Aug.	15,045	3,868	18,913
Sept.	7,241	2,821	10,062
Oct.	14,973	4,028	19,001
Nov.	32,005	5,895	37,900
Dec.* ...	32,000	6,000	38,000
1956	373,672	98,695	472,367
1955	377,598	75,082	452,680
1954	285,595	66,395	351,990
1953	366,535	117,260	483,795
1952	284,622	149,107	433,729
1951	281,634	133,160	414,794
1950	282,655	105,425	388,080
1949	192,981	97,955	290,936
1948	167,841	95,819	263,660
1947	167,441	92,590	260,031

Ward's Automotive Reports. *Estimated.

Passenger Auto Imports

Number of Cars

1957		1954........	34,555
1st Half	114,636	1953........	29,505
1956........	107,675	1952........	33,312
1955........	57,115	1951........	23,701

U. S. Department of Commerce.

Bicycles Shipped

1957*......	1,900,000	1952.......	1,910,000
1956.......	1,739,710	1951.......	1,800,000
1955.......	1,729,300	1950.......	1,950,000
1954.......	1,500,000	1949.......	1,600,000
1953.......	2,000,000	1948.......	2,750,000

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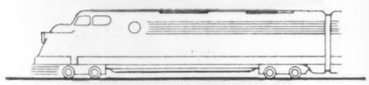
*Estimated.



New Locomotive Units Put in Service by Class 1 Railroads†

	1957	1956	1955	1954	1953‡
Jan.	117	126	121	159	161
Feb.	127	118	100	80	165
Mar.	133	155	85	182	243
Apr.	114	136	107	137	268
May	119	126	103	130	257
June	125	124	83	100	193
July	112	120	71	54	112
Aug.	73	127	31	36	155
Sept.	99	93	85	75	117
Oct.	..	96	108	33	155
Nov.	..	122	131	37	150
Dec.	..	110	157	89	119
Totals	..	1,453	1,182	1,112	2,110

YEARLY TOTALS‡

1952	3,065	1950	2,396
1951	3,459	1949	1,865

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†Includes diesel-electric, gas turbine-electric, and steam turbine-electric.

‡Yearly totals include these steam engine units: 1953—15; 1952—19; 1951—18; 1950—12; 1949—57.

Association of American Railroads.

Buses

Shipments from U. S. Factories

	1957	1956	1955	1954
Jan.	269	253	190	405
Feb.	238	278	176	328
Mar.	341	434	325	348
Apr.	506	371	519	379
May	462	362	313	323
June	389	503	309	351
July	309	307	296	245
Aug.	315	429	434	309
Sept.	243	368	223	326
Oct.	...	298	469	372
Nov.	...	233	359	305
Dec.	...	228	410	427
Totals	...	4,064	4,023	4,118

YEARLY TOTALS

1953	4,057	1948	12,299
1952	5,375	1947	19,110
1951	9,460	1946	10,188
1950	4,908	1945	9,500
1949	5,511	1944	5,799

Automobile Manufacturers Association.

New Transit Equipment Delivered

	Surface Cars	Subway & Elevated Cars	Trolley Coaches	Motor Buses	Total
1957*	0	434	0	2,300	2,734
1956	0	376	0	2,759	3,135
1955	0	288	43	2,098	2,429
1954	0	260	0	2,225	2,485
1953	0	0	0	2,246	2,246
1952	19	0	224	1,749	1,992
1951	56	140	600	4,552	5,348
1950	4	199	179	2,668	3,050
1949	273	415	680	3,358	4,726
1948	478	248	1,430	7,009	9,165
1947	626	2	955	12,029	13,612
1946	421	0	266	6,463	7,150

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*Estimated.

American Transit Association.

Batteries Shipped

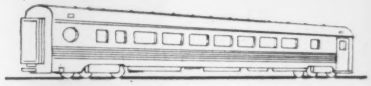
Automotive Replacement Only—Thousands

	1957	1956	1955	1954	1953	1952
Jan.	2,638	2,058	1,518	1,836	1,571	1,639
Feb.	1,961	1,340	1,691	1,461	1,162	963
Mar.	1,254	1,348	1,356	1,226	1,202	769
Apr.	1,178	1,368	1,315	1,180	1,245	850
May	1,605	1,761	1,614	1,429	1,455	1,137
June	1,878	1,807	1,842	1,883	2,004	1,535
July	2,469	2,178	2,078	2,350	2,528	2,526
Aug.	2,856	2,571	2,852	2,548	2,707	2,905
Sept.	2,692	2,711	3,120	2,800	2,852	2,874
Oct.	....	3,015	3,120	2,739	2,825	3,112
Nov.	....	2,592	2,697	2,475	2,173	2,168
Dec.	....	2,265	2,625	1,844	1,890	1,975
Totals	....	25,014	25,828	23,771	23,614	22,453

YEARLY TOTALS

1951	22,219	1950	24,442

U. S. Department of Commerce.



Railroad Passenger Cars

Shipments—Number of Cars

	1957	1956	1955	1954	1953
Jan.	9	42	40	29	15
Feb.	23	53	36	40	17
Mar.	6	54	45	59	39
Apr.	11	25	36	64	37
May	41	53	49	41	27
June	65	40	55	44	26
July	27	29	39	65	37
Aug.	43	48	45	52	42
Sept.	187	46	355	42	34
Oct.	387	26	206	38	46
Nov.	..	5	38	54	44
Dec.	..	9	39	57	27

MONTHLY AVERAGES

1956	31	1950	80	1944	83
1955	82	1949	83	1943	59
1954	49	1948	69	1942	33
1953	33	1947	58	1941	30
1952	11	1946	114	1940	23
1951	23	1945	77	1939	23

Domestic Orders†—Number of Cars

	1957	1956	1955	1954	1953
Jan.	7	75	40	3	0
Feb.	15	6	0	43	15
Mar.	10	1	273	5	18
Apr.	1	5	5	0	21
May	0	0	152	0	12
June	12	53	23	1	22
July	10	0	28	65	16
Aug.	0	0	2	0	0
Sept.	0	70	6	177	9
Oct.	23	9	45	11	2
Nov.	0	0	4	5	47
Dec.	...	50	500	300	2
Totals	...	269	1,078	610	164

YEARLY TOTALS

1952	520	1949	109
1951	261	1948	506
1950	102	1947	316

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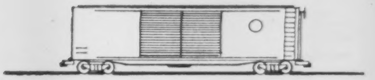
†Including express refrigerator cars.

American Railway Car Institute.



Freight Cars Ordered

Domestic

	Car Builders	Railroad Shops	Total No. Cars
1957			
10 Mo.	19,096	22,405	41,501
Jan.	1,670	3,658	5,328
Feb.	1,865	4,200	6,065
Mar.	817	4,542	5,359
Apr.	6,429	62	6,491
May	2,001	1,422	3,423
June	2,132	2,786	4,918
July	835	416	1,251
Aug.	1,068	2,135	3,203
Sept.	1,753	1,504	3,257
Oct.	526	1,680	2,206
Nov.	....	....	....
Dec.	....	....	....
1956	31,571	8,423	39,994
Jan.	806	9	815
Feb.	1,420	231	1,651
Mar.	1,436	128	1,564
Apr.	5,426	1,106	6,532
May	1,917	372	2,289
June	2,731	28	2,759
July	1,363	1,268	2,631
Aug.	2,295	51	2,346
Sept.	3,794	108	3,902
Oct.	4,407	2,115	6,522
Nov.	1,610	2,450	4,060
Dec.	4,366	557	4,923

YEARLY TOTALS

1955	83,695	79,338	163,033
1954	14,240	7,736	21,976
1953	23,429	10,136	33,565
1952	22,672	11,697	34,369
1951	56,112	36,119	92,231

American Railway Car Institute.

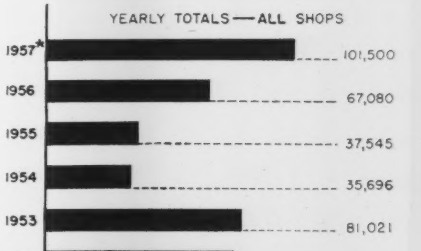
FREIGHT CAR SHIPMENTS

Domestic—Number of Cars

	Car Builders	Railroad Shops	Total No. Cars
1957			
10 Mo.	48,789	35,850	84,639
Jan.	4,686	3,136	7,822
Feb.	4,576	3,079	7,655
Mar.	5,611	4,161	9,772
Apr.	5,198	3,763	8,961
May	5,124	3,700	8,824
June	4,629	3,748	8,377
July	4,664	3,061	7,725
Aug.	4,587	4,171	8,758
Sept.	4,897	3,553	8,450
Oct.	4,817	3,478	8,295
Nov.	....	....	....
Dec.	....	....	....
1956	42,502	24,578	67,080
Jan.	2,981	1,218	4,199
Feb.	3,264	1,729	4,993
Mar.	4,332	1,623	5,955
Apr.	4,128	1,815	5,943
May	4,493	2,174	6,667
June	3,261	2,289	5,550
July	3,117	2,227	5,344
Aug.	2,783	2,581	5,364
Sept.	1,821	1,623	3,444
Oct.	3,728	1,938	5,666
Nov.	4,322	2,373	6,695
Dec.	4,272	2,988	7,260

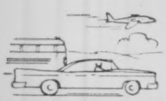
YEARLY TOTALS

1955	23,786	13,759	37,545
1954	22,318	13,378	35,696
1953	53,298	27,723	81,021
1952	53,587	24,246	77,833
1951	67,744	28,249	95,993



American Railway Car Institute.

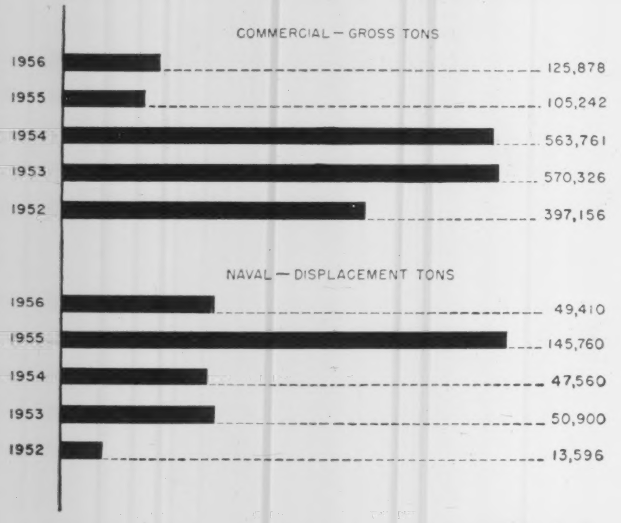
*Estimated.



Transportation

SHIPS DELIVERED FROM PRIVATE YARDS

(UNITED STATES)



Shipbuilding in U. S. Private Yards

(Steel vessels of 1000 gross tons or more)

	1956		1955	
COMMERCIAL VESSELS	Number	Tons†	Number	Tons†
Under construction Jan. 1	25	312,290‡	15	224,822‡
Contracted for during year	68	1,715,406	18	195,760
Totals	93	2,027,696	33	420,582
Launched during year	12	156,440	3	47,580
Delivered during year	9	125,878	8	105,242
Under construction Dec. 31	84	1,901,818	25	315,340
NAVAL VESSELS				
Under construction Jan. 1	42	246,650‡	44	306,550‡
Contracted for during year	22	86,895	13	92,670
Totals	64	333,545	57	399,220
Launched during year	17	109,730	13	72,970
Delivered during year	9	49,410	14	145,760
Under construction Dec. 31	55	284,135	43	253,460

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†Gross tons for commercial vessels and displacement tons for Naval vessels.
‡Revised.
Shipbuilders Council of America.

Civil Aircraft

Complete Airplanes Shipped

	Number		Value (Thousands)	
	1957	1956	1957	1956
January	584	537	$48,431	$22,325
February	523	614	49,278	32,139
March	665	656	46,465	29,562
April	642	692	57,723	30,229
May	662	714	83,965	35,145
June	580	648	69,326	40,270
July	515	507	70,480	32,280
August	509	681	62,825	46,294
September	456	613	54,745	41,137
October	. . .	508	. . . .	50,089
November	. . .	472	. . . .	51,518
December	. . .	563	. . . .	43,168

YEARLY TOTALS

	Number	Value
1956	7,205	$454,156,000
1955	4,820	271,250,000
1954	3,389	295,738,000

U. S. Bureau of the Census.

Engines for Civil Aircraft

Shipments

	Number		Value (Thousands)	
	1957	1956	1957	1956
January	920	930	$12,445	$6,800
February	902	976	13,596	6,923
March	1,010	1,065	13,975	7,600
April	950	949	14,388	7,967
May	1,020	1,038	15,160	9,459
June	933	977	15,636	8,682
July	801	996	12,748	8,420
August	776	1,037	8,603	8,036
September	728	793	10,150	9,938
October	. . .	902	. . . .	10,677
November	. . .	911	. . . .	11,391
December	. . .	925	. . . .	12,370

YEARLY TOTALS

	Number	Value
1956	11,499	$108,263
1955	7,639	59,147
1954	5,519	60,647

U. S. Bureau of the Census.

Commercial Ship Construction

Steel self-propelled vessels of 2000 gross tons and over built in private U. S. yards.†

Year	No.	Gross Tonnage	Year	No.	Gross Tonnage
1956	9	125,878	1950	26	415,499
1955	8	105,242	1949	34	538,873
1954	38	563,761	1948	29	164,482
1953	45	570,326	1947	50	286,473
1952	31	397,156	1946	88	672,554
1951	10	147,569	1945	1,067	7,663,362

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†On Jan. 1, 1957, 84 steel vessels of 1000 gross tons or over aggregating 1,901,818 gross tons were under construction, compared with 25 vessels aggregating 312,290 gross tons on Jan. 1, 1956.

TYPES OF VESSELS CONSTRUCTED—1956

(Steel Vessels of 1000 Gross Tons or Over)

Type	Number	Gross Tonnage
Tanker	6	106,454
Cargo	1	12,580
Ore Carrier	2	6,844
Totals	9	125,878

CONTRACTED FOR IN 1956

(Steel Vessels of 1000 Gross Tons or Over)

Type	Number	Gross Tonnage
Tanker	62	1,649,906
Passenger-Cargo	2	30,000
Train Ferry	1	2,500
Drilling Tender	1	2,500
Ore Carrier	2	30,500
Totals	68	1,715,406

UNCOMPLETED VESSELS

(Steel Vessels of 1000 Gross Tons or Over)
Jan. 1, 1957

Type	Number	Gross Tonnage
Tanker	70	1,766,418
Cargo	3	7,500
Cargo Ship, Dock	1	12,000
Passenger-Cargo	4	66,400
Ore Carrier	2	30,500
Roll-on Roll-off	1	12,000
Passenger-Auto Ferry	1	2,000
Drilling Tender	1	2,500
Train Ferry	1	2,500
Totals	84	1,901,818

Naval Shipbuilding

PRIVATE YARDS' NAVAL BACKLOG

Jan. 1, 1957

Type	Number	Displacement Tonnage
Aircraft Carrier	2	112,300
Destroyer	14	39,270
Landing Ship, Dock	1	6,880
Landing Ship, Tank	6	21,000
Ammunition Ship	4	32,070
Submarine	9	21,670
Destroyer Escort	13	17,100
Guided Missile Cruiser	1	14,000
Frigate	5	19,845
Totals	55	284,135

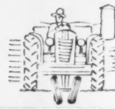
CONTRACTED FOR IN 1956

Guided Missile Cruiser	1	14,000
Destroyer	7	19,670
Escort Vessel	1	5,400
Frigate	5	19,845
Submarine	2	3,380
Ammunition Ship	3	24,600
Totals	22	86,895

DELIVERED IN 1956

Destroyer	3	8,400
Ammunition Ship	1	7,470
Escort Vessel	1	1,300
Landing Ship, Dock	3	20,640
Oiler	1	11,600
Totals	9	49,410

Shipbuilders Council of America.



Farm Equipment

FARM MACHINERY & EQUIPMENT

Manufacturers' Shipments in Thousands

(Except Tractors)

	Total	Domestic	Export
1956..........	$854,787	$777,971	$76,816
1955..........	912,157	844,370	67,787
1954..........	883,267	n.a.	n.a.
1953..........	1,003,264	908,705	94,559
1952..........	1,104,054	1,012,553	91,501
1951..........	1,218,966	1,123,918	95,048

Plows and Listers

	Total	Domestic	Export
1957			
9 Mo.	$35,240	n.a.	n.a.
1956....	60,972	$54,602	$6,370
1955....	66,417	58,440	7,977
1954....	66,506	57,445	9,061
1953....	68,703	59,252	9,451
1952....	92,632	80,058	12,574
1951....	111,512	96,013	15,499

Harrows, Rollers, Pulverizers, Stalk Cutters

1957			
9 Mo.	$51,505	n.a.	n.a.
1956....	73,983	$66,986	$6,997
1955....	74,706	67,024	7,682
1954....	70,605	63,759	6,846
1953....	78,785	73,011	5,774
1952....	84,558	78,310	6,248
1951....	94,188	86,922	7,266

Planting, Seeding, and Fertilizing Machinery

1957			
9 Mo.	$59,655	n.a.	n.a.
1956....	80,206	$75,252	$4,954
1955....	89,098	84,648	4,450
1954....	93,593	89,697	3,896
1953....	107,443	103,148	4,295
1952....	127,366	121,635	5,731
1951....	134,062	127,192	6,870

Cultivators and Weeders

1957			
9 Mo.	$32,657	n.a.	n.a.
1956....	49,379	$46,736	$2,643
1955....	52,640	49,712	2,928
1954....	42,584	39,304	3,280
1953....	54,829	51,665	3,164
1952....	71,605	67,725	3,880
1951....	80,983	75,987	4,996

Sprayers and Dusters

1957			
9 Mo.	$27,794	n.a.	n.a.
1956....	41,410	$37,432	$3,978
1955....	38,254	33,695	4,559
1954....	37,674	33,868	3,806
1953....	34,701	31,416	3,285
1952....	36,429	32,288	4,141
1951....	42,530	37,718	4,812

Harvesting Machinery

1957			
9 Mo.	$195,344	n.a.	n.a.
1956....	226,139	$202,400	$23,739
1955....	243,561	223,552	20,009
1954....	252,566	219,661	32,905
1953....	294,024	248,001	46,023
1952....	309,384	272,329	37,055
1951....	345,084	313,077	32,007

Haying Machinery

1957			
9 Mo.	108,168	n.a.	n.a.
1956....	146,618	128,713	17,905
1955....	168,447	157,968	10,479
1954....	147,883	137,192	10,691
1953....	191,441	179,071	12,370
1952....	202,962	191,267	11,695
1951....	209,546	196,615	12,931

Machines for Preparing Crops for Market or for Use

	Total	Domestic	Export
1957			
9 Mo.	$18,956	n.a.	n.a.
1956....	31,437	$28,209	$3,328
1955....	33,070	29,511	3,559
1954....	33,892	29,708	4,184
1953....	29,919	25,745	4,174
1952....	31,461	26,878	4,583
1951....	36,406	31,178	5,228

Farm Poultry Equipment

1957....	n.a.	n.a.	n.a.
1956....	$36,058	$33,885	$2,173
1955....	28,429	27,085	1,344
1954....	25,566	24,153	1,413
1953....	27,216	25,931	1,285
1952....	25,442	24,556	886
1951....	34,611	33,540	1,071

Farm Dairy Machines and Equipment

1957			
9 Mo.	$11,227	n.a.	n.a.
1956....	21,455	$19,741	$1,714
1955....	19,260	17,241	2,019
1954....	22,183	21,310	873
1953....	24,370	22,818	1,552
1952....	21,471	19,778	1,693
1951....	22,310	20,668	1,642

Barn Equipment

1957....	n.a.	n.a.	n.a.
1956....	$15,460	$15,140	$320
1955....	12,405	12,084	321
1954....	12,856	n.a.	n.a.
1953....	15,107	14,951	156
1952....	15,526	15,454	72
1951....	13,719	13,702	17

Barnyard Equipment

1957....	n.a.	n.a.	n.a.
1956....	$15,401	$15,251	$150
1955....	18,381	n.a.	n.a.
1954....	16,742	n.a.	n.a.
1953....	12,507	12,439	68
1952....	15,064	15,005	59
1951....	21,641	21,574	67

Farm Wagons, Trucks, and Other Farm Transportation Equipment

1957			
9 Mo.	$18,010	n.a.	n.a.
1956....	23,445	$22,266	$1,179
1955....	29,238	28,221	1,017
1954....	23,545	n.a.	n.a.
1953....	26,555	25,213	1,342
1952....	29,505	28,046	1,459
1951....	32,996	31,312	1,684

Farm Elevators and Blowers

1957....	n.a.	n.a.	n.a.
1956....	$32,824	$31,358	$1,466
1955....	38,251	36,808	1,443
1954....	37,072	n.a.	n.a.
1953....	37,664	36,044	1,620
1952....	40,649	39,224	1,425
1951....	39,378	38,420	958
1950....	34,682	33,766	916

n.a. = not available.
U. S. Bureau of the Census.

TRACTORS

Manufacturers' Shipments

TOTAL—ALL TYPES

Year	Number	Value (in thousands)
1956....	486,568	$980,927
1955....	572,096	966,347
1954....	488,301	736,029
1953....	652,761	948,287
1952....	667,824	924,615
1951....	777,467	1,042,719
1950....	698,344	820,031
1949....	720,644	792,881

WHEEL TYPE

(Except garden)

Year	Number	Value (in thousands)
1957		
9 Mo.	184,534	$339,113
1956....	227,920	484,428
1955....	330,581	582,904
1954....	256,692	443,267
1953....	390,366	590,322
1952....	417,177	615,676
1951....	559,973	758,001
1950....	499,917	574,295
1949....	545,368	545,368

TRACKLAYING TYPE

Year	Number	Value (in thousands)
1957		
9 Mo.	32,597	$306,114
1956....	55,417	471,384
1955....	48,891	359,443
1954....	40,374	267,918
1953....	50,597	328,696
1952....	48,155	280,841
1951....	49,142	259,960
1950....	44,600	223,487
1949....	43,849	199,423

GARDEN TYPE

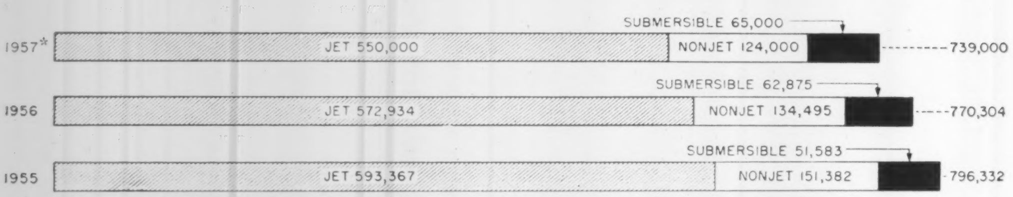
Year	Number	Value (in thousands)
1956....	203,231	$25,115
1955....	192,624	24,000
1954....	191,235	24,844
1953....	211,798	29,269
1952....	202,492	28,098
1951....	168,352	24,758
1950....	153,827	22,249
1949....	131,427	21,028

U. S. Bureau of the Census.

Farm Equipment

METALWORKING FACTS AND FIGURES

DOMESTIC WATER SYSTEMS† Factory Shipments



Jet Pump Systems

1957	Units		Units
Jan.	28,397	July	34,634
Feb.	24,425	Aug.	37,478
Mar.	30,385	Sept.	35,822
Apr.	29,847	Oct.	.....
May	38,156	Nov.	.....
June	34,834	Dec.	.....

1956	Units	Value
Jan.	45,436	$3,804,000
Feb.	41,322	3,409,000
Mar.	44,472	3,675,000
Apr.	47,969	4,063,000
May	54,768	4,522,000
June	56,446	4,659,000
July	55,300	4,686,000
Aug.	61,076	5,061,000
Sept.	51,488	4,325,000
Oct.	52,546	4,319,000
Nov.	34,165	2,845,000
Dec.	27,946	2,267,000

YEARLY TOTALS

1957*	550,000	n.a.
1956	572,934	$47,635,000
1955	593,367	50,835,000

U. S. Bureau of the Census.

Nonjet Pump Systems

1957	Units		Units
Jan.	8,323	July	12,331
Feb.	9,516	Aug.	11,321
Mar.	10,022	Sept.	10,056
Apr.	11,821	Oct.	.....
May	11,660	Nov.	.....
June	11,223	Dec.	.....

1956	Units	Value
Jan.	9,964	$866,000
Feb.	10,507	922,000
Mar.	9,807	868,000
Apr.	13,356	1,115,000
May	14,451	1,152,000
June	12,548	1,070,000
July	12,850	1,111,000
Aug.	13,365	1,128,000
Sept.	11,565	1,032,000
Oct.	10,837	1,027,000
Nov.	8,518	784,000
Dec.	6,727	644,000

YEARLY TOTALS

1957*	124,000	n.a.
1956	134,495	$11,719,000
1955	151,382	12,620,000
1954	167,427	13,596,000
1953	196,995	16,630,000
1952	249,145	25,972,000
1951	237,408	22,303,000

Submersible Pumps

1957	Units		Units
Jan.	4,166	July	6,701
Feb.	3,657	Aug.	8,018
Mar.	4,102	Sept.	7,244
Apr.	4,386	Oct.	.....
May	6,006	Nov.	.....
June	5,571	Dec.	.....

1956	Units	Value
Jan.	3,437	$794,000
Feb.	3,664	783,000
Mar.	3,943	837,000
Apr.	4,837	989,000
May	6,653	1,349,000
June	7,436	1,497,000
July	6,177	1,305,000
Aug.	6,754	1,372,000
Sept.	6,178	1,194,000
Oct.	5,890	1,153,000
Nov.	5,120	977,000
Dec.	2,786	572,000

YEARLY TOTALS

1957*	65,000	n.a.
1956	62,875	$12,822,000
1955	51,583	11,444,000

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*Estimated.

†Convertible jet pump systems, not included elsewhere, totaled 148,452 units for the first nine months of 1957.

Domestic Hand and Windmill Pumps

Factory Shipments

1957	Units		Units
Jan.	11,106	July	11,653
Feb.	10,984	Aug.	17,191
Mar.	11,540	Sept.	15,372
Apr.	14,333	Oct.	.....
May	16,245	Nov.	.....
June	11,405	Dec.	.....

1956	Units	Value
Jan.	14,325	$87,000
Feb.	17,633	111,000
Mar.	16,876	94,000
Apr.	13,029	88,000
May	11,774	90,000
June	18,444	118,000
July	19,898	123,000
Aug.	17,233	95,000
Sept.	12,539	83,000
Oct.	11,040	81,000
Nov.	6,548	54,000
Dec.	8,236	58,000

YEARLY TOTALS

1956	167,575	$1,082,000
1955	206,881	1,343,000
1954	223,282	1,433,000
1953	225,754	1,667,000
1952	242,636	1,809,000
1951	245,791	1,725,000
1950	334,357	1,941,000
1949	327,415	2,186,000
1948	456,650	2,892,000
1947	368,532	2,322,000
1946	313,023	1,623,000
1945	314,638	1,689,000
1944	380,240	1,955,000
1943	368,249	1,730,000
1942	377,331	1,631,000
1941	490,586	1,896,000

U. S. Bureau of the Census.

Pump Jacks

Factory Shipments

1957	Units		Units
Jan.	1,220	July	1,010
Feb.	1,086	Aug.	1,448
Mar.	975	Sept.	1,084
Apr.	890	Oct.	....
May	1,261	Nov.	....
June	845	Dec.	....

1956	Units	Value
Jan.	2,505	$72,000
Feb.	2,137	65,000
Mar.	2,258	64,000
Apr.	2,018	68,000
May	1,274	38,000
June	2,078	70,000
July	1,803	55,000
Aug.	2,290	70,000
Sept.	1,646	56,000
Oct.	1,275	43,000
Nov.	1,047	31,000
Dec.	1,055	35,000

YEARLY TOTALS

1956	21,386	$667,000
1955	26,654	771,000
1954	27,136	815,000
1953	29,801	893,000
1952	31,961	975,000
1951	37,461	1,149,000
1950	43,237	1,187,000
1949	36,854	1,034,000
1948	41,952	1,083,000
1947	54,187	1,450,000
1946	89,460	2,257,000
1945	62,451	1,418,000
1944	56,550	1,230,000
1943	31,065	610,000
1942	55,665	906,000
1941	59,058	856,000
1940	47,842	630,000
1939	37,133	464,000

U. S. Bureau of the Census.

Windmill Heads

Factory Shipments

1957	Units		Units
Jan.	412	July	724
Feb.	649	Aug.	509
Mar.	596	Sept.	544
Apr.	892	Oct.	...
May	668	Nov.	...
June	523	Dec.	...

1956	Units	Value
Jan.	618	$70,000
Feb.	600	72,000
Mar.	652	75,000
Apr.	1,081	116,000
May	1,116	138,000
June	806	85,000
July	1,019	119,000
Aug.	819	93,000
Sept.	779	101,000
Oct.	636	90,000
Nov.	554	67,000
Dec.	766	113,000

YEARLY TOTALS

1956	9,146	$1,139,000
1955	10,482	1,106,000
1954	11,289	1,105,000
1953	10,783	988,000
1952	13,918	1,245,000
1951	16,700	1,498,000
1950	20,736	1,674,000
1949	19,188	1,675,000
1948	31,835	2,183,000
1947	39,076	2,424,000
1946	46,004	2,113,000
1945	41,761	1,786,000
1944	40,540	1,699,000
1943	34,523	1,537,000
1942	37,642	1,624,000
1941	43,159	1,757,000
1940	45,787	1,755,000
1939	52,706	2,100,000

U. S. Bureau of the Census.

Windmill Towers

Factory Shipments

1957	Units		Units
Jan.	185	July	373
Feb.	267	Aug.	218
Mar.	236	Sept.	288
Apr.	330	Oct.	...
May	258	Nov.	...
June	179	Dec.	...

1956	Units	Value
Jan.	276	$31,000
Feb.	243	29,000
Mar.	345	41,000
Apr.	372	39,000
May	457	56,000
June	273	32,000
July	403	41,000
Aug.	286	36,000
Sept.	380	48,000
Oct.	316	48,000
Nov.	289	35,000
Dec.	367	50,000

YEARLY TOTALS

1956	4,007	$489,000
1955	4,470	526,000
1954	4,911	552,000
1953	5,088	477,000
1952	6,795	625,000
1951	9,416	832,000
1950	9,092	788,000
1949	9,843	901,000

Water Softeners†

Factory Shipments

1957	Units	Value
1st Qtr.	53,575	$5,804,000
2nd Qtr.	55,678	6,154,000
1956	223,597	$22,262,000

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†Farm and household.

U. S. Bureau of the Census.

Business Indexes

METALWORKING FACTS AND FIGURES

INDEXES OF INDUSTRIAL PRODUCTION

FEDERAL RESERVE BOARD—1947-49 = 100

Total Industrial Production

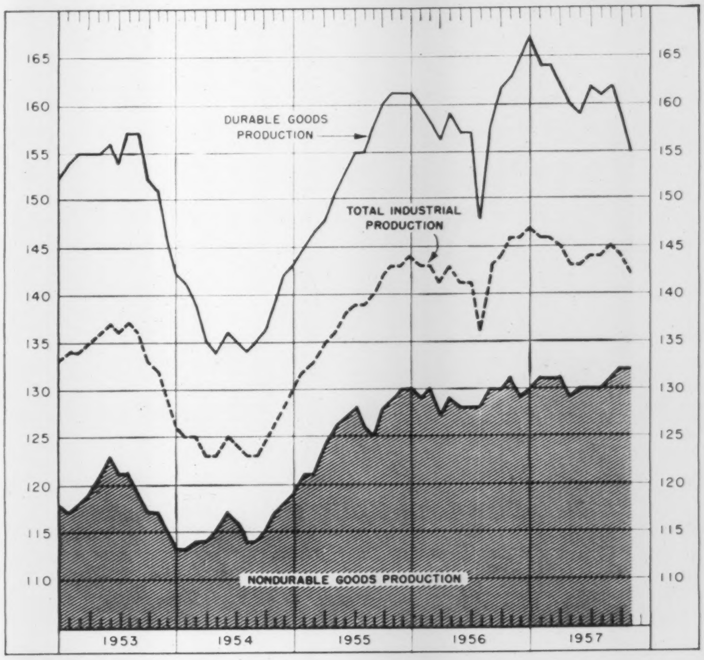
Adjusted for Seasonal Variation

	1957	1956	1955	1954	1953
Jan.	146	143	132	125	134
Feb.	146	143	133	125	134
Mar.	145	141	135	123	135
Apr.	143	143	136	123	136
May	143	141	138	125	137
June	144	141	139	124	136
July	144	136	139	123	137
Aug.	145	143	140	123	136
Sept.	144	144	142	124	133
Oct.	142	146	143	126	132
Nov.	...	146	143	128	129
Dec.	...	147	144	130	126

YEARLY INDEXES

1957*...	144	1952....	124	1947....	100
1956....	143	1951....	120	1946....	90
1955....	139	1950....	112	1945....	107
1954....	125	1949....	97	1944....	125
1953....	134	1948....	104	1943....	127

Estimated.



Primary Metals

Adjusted for Seasonal Variation

	1957	1956	1955	1954	1953
Jan.	144	148	127	111	135
Feb.	143	146	131	109	137
Mar.	137	145	136	103	136
Apr.	134	146	138	103	136
May	132	141	140	106	139
June	132	136	143	108	137
July	133	69	134	103	136
Aug.	136	125	139	105	137
Sept.	131	148	146	105	130
Oct.	126	147	148	111	128
Nov.	...	146	149	118	122
Dec.	...	145	150	121	113

Metal Fabricating

Adjusted for Seasonal Variation

	1957	1956	1955	1954	1953
Jan.	180	170	157	155	168
Feb.	180	168	158	151	168
Mar.	179	167	160	147	168
Apr.	176	170	162	147	169
May	175	167	163	148	169
June	177	168	164	147	168
July	177	169	166	147	171
Aug.	177	172	168	148	171
Sept.	174	174	170	149	166
Oct.	170	176	173	150	166
Nov.	...	180	172	153	159
Dec.	...	183	172	155	156

Durable Goods

Adjusted for Seasonal Variation

	1957	1956	1955	1954	1953
Jan.	164	160	145	141	154
Feb.	164	158	147	139	155
Mar.	162	157	148	135	155
Apr.	160	159	151	134	155
May	159	157	153	136	156
June	162	157	155	135	154
July	161	148	155	134	157
Aug.	162	158	158	135	157
Sept.	159	162	160	137	152
Oct.	155	163	161	139	151
Nov.	....	165	161	142	146
Dec.	...	167	161	143	142

Nondurable Goods

Adjusted for Seasonal Variation

	1957	1956	1955	1954	1953
Jan.	131	130	121	113	117
Feb.	131	130	121	114	118
Mar.	131	128	124	114	119
Apr.	129	130	126	115	121
May	130	129	127	117	123
June	130	128	128	116	121
July	130	128	126	114	121
Aug.	131	130	125	114	119
Sept.	132	130	128	115	117
Oct.	132	131	129	117	117
Nov.	...	129	130	118	115
Dec.	...	130	130	119	112

Consumer Price Index

Cost of Living, 1947-49=100

	1957	1956	1955	1954
January	118.2	114.6	114.3	115.2
February ...	118.7	114.6	114.3	115.0
March	118.9	114.7	114.3	114.8
April	119.3	114.9	114.2	114.6
May	119.6	115.4	114.2	115.0
June	120.2	116.2	114.4	115.1
July	120.8	117.0	114.7	115.2
August	121.0	116.8	114.5	115.0
September ..	121.1	117.1	114.9	114.7
October	121.1	117.7	114.9	114.5
November ...	....	117.8	115.0	114.6
December ...	....	118.0	114.7	114.3

MONTHLY AVERAGES

1957*......	120.1	1955.......	114.5
1956.......	116.2	1954.......	114.8

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*Estimated.

U. S. Bureau of Labor Statistics.

Wholesale Price Indexes

1947-49=100

ALL COMMODITIES

	1957	1956
January	116.9	111.9
February	117.0	112.4
March	116.9	112.8
April	117.2	113.6
May	117.1	114.4
June	117.4	114.2
July	118.2	114.0
August	118.4	114.7
September	118.0	115.5
October	117.7	115.6
November	....	115.9
December	....	116.3

ALL COMMODITIES OTHER THAN FARM PRODUCTS AND FOOD

	1957	1956
January	125.2	120.4
February	125.5	120.6
March	125.4	121.0
April	125.4	121.6
May	125.2	121.7
June	125.2	121.5
July	125.7	121.4
August	126.0	122.5
September	126.0	123.1
October	125.7	123.6
November	....	124.2
December	....	124.7

U. S. Bureau of Labor Statistics.

Labor

METALWORKING FACTS AND FIGURES

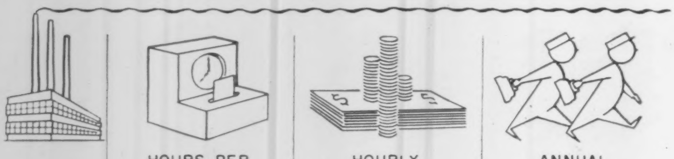
METALWORKING WAGES & HOURS (Production Workers)

(Average Hourly Wages and Average Weekly Hours)

	PRIMARY METALS		FABRICATED METAL PRODUCTS		MACHINERY Except Electrical		ELECTRICAL MACHINERY		TRANSPORTATION EQUIPMENT		INSTRUMENTS Related Products	
	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours	Wages	Hours
1957												
Jan.	$2.47	41.0	$2.13	40.8	$2.27	41.9	$2.05	40.4	$2.38	41.7	$2.08	40.7
Feb.	2.46	40.3	2.13	41.0	2.27	41.9	2.05	40.6	2.37	41.5	2.09	41.0
Mar.	2.46	40.1	2.14	41.0	2.28	41.8	2.06	40.5	2.38	41.1	2.10	40.7
Apr.	2.46	39.8	2.15	40.9	2.28	41.4	2.06	40.3	2.37	40.6	2.10	40.6
May	2.46	39.6	2.16	40.9	2.28	41.1	2.05	40.1	2.37	39.9	2.10	40.2
June	2.48	40.2	2.17	41.2	2.30	41.1	2.06	40.3	2.40	40.1	2.11	40.5
July	2.52	39.9	2.18	40.8	2.30	40.7	2.05	39.6	2.41	39.7	2.11	40.1
Aug.	2.53	39.4	2.19	41.0	2.30	40.5	2.05	40.0	2.42	40.1	2.10	40.0
Sept.	2.56	39.4	2.22	41.4	2.32	40.7	2.07	40.3	2.46	39.9	2.13	40.4
Oct.	2.54	38.0	2.21	40.7	2.31	40.0	2.07	39.4	2.46	40.1	2.13	40.1
1956 (Avg)	2.36	40.9	2.07	41.2	2.21	42.2	1.98	40.8	2.31	41.0	2.01	40.8
1955 (Avg)	2.24	41.2	1.98	41.6	2.09	41.8	1.88	40.7	2.23	41.9	1.91	40.8

U. S. Department of Labor.

METALWORKING PRODUCTION WORKERS



	HOURS PER WEEK (average)	HOURLY EARNINGS (average)	ANNUAL EMPLOYMENT (average)
1957*	40.3 HOURS	$2.26	5,684,000
1956	41.1 HOURS	$2.16	5,712,200
1955	41.3 HOURS	$2.05	5,610,500

METALWORKING EMPLOYMENT

(All Wage and Salary Workers, in Thousands)

	TOTAL	Primary Metals	Fabricated Metal Products	Machinery Except Electrical	Electrical Machinery	Trans-portation Equip.	Instru-ments etc.
1957							
Jan.	7,800.8	1,355.4	1,137.8	1,752.4	1,236.2	1,977.3	341.7
Feb.	7,809.1	1,348.8	1,138.8	1,763.6	1,232.0	1,984.7	341.2
Mar.	7,786.8	1,338.2	1,134.1	1,764.0	1,228.2	1,980.1	342.2
Apr.	7,715.6	1,328.0	1,128.2	1,750.1	1,216.2	1,950.8	342.3
May	7,659.8	1,318.7	1,121.1	1,728.4	1,211.2	1,941.4	339.0
June	7,645.0	1,318.9	1,125.6	1,714.6	1,222.0	1,925.9	338.0
July	7,540.5	1,302.7	1,108.2	1,686.4	1,219.7	1,888.3	335.2
Aug.	7,533.2	1,306.5	1,118.2	1,658.7	1,232.8	1,876.5	340.5
Sept.	7,431.2	1,294.5	1,118.1	1,657.7	1,251.1	1,771.0	338.8
Oct.	7,442.3	1,279.7	1,122.8	1,625.3	1,242.7	1,838.6	333.2
1956 (Avg)	7,513.3	1,311.0	1,116.6	1,716.4	1,202.9	1,830.5	335.9
1955 (Avg)	7,261.7	1,284.1	1,108.6	1,592.3	1,123.6	1,832.1	321.0

U. S. Department of Labor.

*Estimated.

Steel Industry's Minimum Labor Rates

	Hourly wage (cents)	Per cent over 1915
1915	20.0	....
Feb. 1, 1916	22.0	10.0
May 1, 1916	25.0	25.0
Dec. 15, 1916	27.5	37.5
May 1, 1917	30.0	50.0
Oct. 1, 1917	33.0	65.0
Apr. 16, 1918	38.0	90.0
Aug. 1, 1918	42.0	110.0
Oct. 1, 1918	46.2	131.0
Feb. 1, 1920	50.6	153.0
May 16, 1921	40.5	102.5
July 16, 1921	37.0	85.0
Aug. 29, 1921	30.0	50.0
Sept. 1, 1922	36.0	80.0
Apr. 16, 1923	40.0	100.0
August, 1923	44.0	120.0
Oct. 1, 1931	39.6	98.0
May 16, 1932	33.7	68.5
Aug. 19, 1933 (NRA)	40.0	100.0
Apr. 1, 1934	44.0	120.0
November, 1936	52.5	162.5
March, 1937	62.5	212.5
April, 1941	72.5	262.5
July, 1942	78.0	290.0
February, 1946	96.5	382.5
April, 1947	109.0	445.0
July 16, 1948	118.5	492.5
Dec. 1, 1950	131.0	555.0
Mar. 1, 1952	143.5	617.5
June 12, 1953	152.0	660.0
July 1, 1954	157.0	685.0
July 1, 1955	168.5	742.5
Aug. 3, 1956	182.0	810.0
July 1, 1957	189.0	845.0

Compiled by STEEL.

Work Stoppages

1957	Number of Stoppages in Effect	Workers Involved	Mandays Lost
10 Mo.	5,050	1,980,000	14,350,000
Jan.	325	80,000	550,000
Feb.	350	130,000	825,000
Mar.	375	120,000	775,000
Apr.	525	190,000	1,380,000
May	650	260,000	1,850,000
June	600	220,000	1,850,000
July	625	260,000	2,500,000
Aug.	575	220,000	1,600,000
Sept.	525	315,000	1,670,000
Oct.	500	185,000	1,350,000
	Number of Stoppages Started	**Workers Involved**	**Mandays Lost**
1956	3,825	1,900,000	33,100,000

U. S. Department of Labor.

Steel Employment, Wages, Hours, and Payrolls

1957 by Months

	Number Employees (Wage and salaried workers)	Avg Hr Earnings (Hourly, piecework, or tonnage wages)	Avg Hr per Week (Hourly, piecework, or tonnage wages)	Total Payrolls (Wages and salaries)
Jan.	677,600‡	$2.831	40.2	$360,620,000
Feb.	677,100	2.852	39.8	327,510,000
Mar.	671,100	2.834	38.7	344,185,000
Apr.	668,200	2.837	38.0	331,520,000
May	666,400	2.824	37.9	338,000,000
June	666,400	2.862	36.7	324,823,000
July	665,300	2.983	34.8	331,600,000
Aug.	663,100	2.990	36.5	313,730,000
Sept.	650,800	3.022	36.4	330,076,000
Oct.	640,300	2.992	38.0	345,580,000
Nov.	......	....	...	....
Dec.	......	....	...	....

1956 by Months

Jan.	681,100	$2.617	39.5	$329,134,000
Feb.	683,700	2.613	40.5	317,326,000
Mar.	685,200	2.604	40.7	338,140,000
Apr.	687,900	2.621	39.7	326,740,000
May	679,800	2.619	40.1	333,570,000
June	683,000	2.640	39.0	322,400,000
July	a.	a.	a.	a.
Aug.	677,200	2.697	34.2	300,920,000
Sept.	687,900	2.784	39.2	338,990,000
Oct.	687,400	2.763	40.6	358,935,000
Nov.	688,900	2.792	39.8	346,041,000
Dec.	688,600	2.804	37.7	347,197,000

1955 by Months

Jan.	605,100	$2.387	37.8	$258,824,000
Feb.	616,400	2.406	40.0	255,130,000
Mar.	629,900	2.385	41.1	288,229,000
Apr.	643,200	2.407	39.9	282,025,000
May	654,000	2.404	39.7	294,073,000
June	667,100	2.420	40.1	298,439,000
July	676,400	2.598	35.0	296,857,000
Aug.	679,900	2.572	38.9	320,730,000
Sept.	680,200	2.602	39.5	317,106,000
Oct.	677,900	2.600	39.4	325,114,000
Nov.	679,800	2.615	40.6	326,109,000
Dec.	681,800	2.618	39.1	330,645,000

1954 by Months

Jan.	644,900	$2.294	35.7	$251,288,000
Feb.	636,100	2.299	37.2	236,574,000
Mar.	620,500	2.278	37.3	249,672,000
Apr.	609,400	2.296	35.8	232,638,000
May	606,400	2.314	34.9	234,413,000
June	608,900	2.315	36.0	236,406,000
July	607,600	2.368	33.4	232,796,000
Aug.	601,100	2.356	35.1	238,778,000
Sept.	597,400	2.368	35.7	234,595,000
Oct.	596,100	2.364	36.6	244,698,000
Nov.	598,800	2.391	37.6	247,722,000
Dec.	604,600	2.372	38.0	262,189,000

MONTHLY AVERAGES AND TOTAL PAYROLLS

1956	684,610	$2.687	39.2	$3,659,393,000
1955	657,642	2.501	39.3	3,593,281,000
1954	611,008	2.335	36.1	2,901,769,000
1953	682,758	2.265	39.4	3,351,586,000
1952†	672,530	2.069	39.5	2,530,950,000
1951	670,717	1.945	40.2	2,881,170,000
1950	635,500	1.746	39.0	2,389,759,000
1949	620,500	1.703	34.5	2,061,770,000
1948	635,600	1.630	39.1	2,234,461,000
1947	616,300	1.513	38.6	1,986,600,000
1946	575,300	1.347	35.1	1,544,142,000
1945	551,200	1.248	44.2	1,645,332,700
1944	571,200	1.219	46.7	1,745,019,700
1943	625,700	1.135	43.0	1,649,227,000
1942	647,200	1.056	38.9	1,467,058,700

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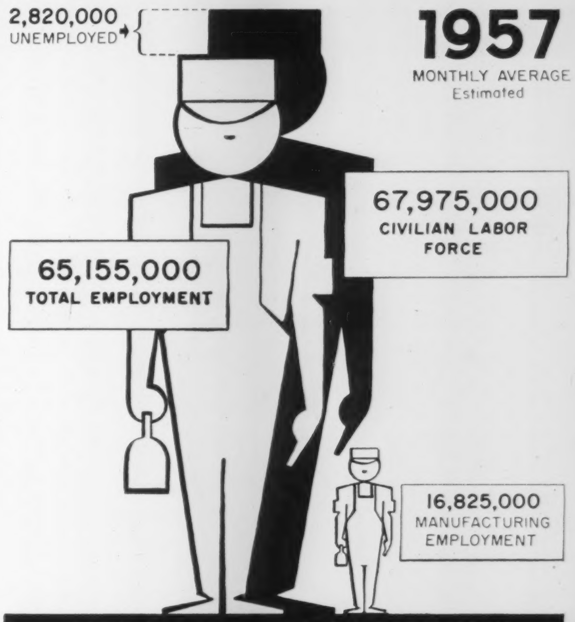
a.—No reports issued because of steelworkers' strike.
†Ten months.
‡Starting in January, 1957, employment figures exclude those engaged in fabricating.
American Iron & Steel Institute.



TOTAL U.S. EMPLOYMENT

(In Thousands)

1957 by Months

	Civilian Labor Force	Total Employment	Unemployment	Mfg. Employment
Jan.	65,821	62,578	3,244	16,959
Feb.	66,311	63,190	3,121	16,945
Mar.	66,746	63,865	2,882	16,933
Apr.	66,951	64,261	2,690	16,822
May	67,893	65,178	2,715	16,762
June	69,842	66,504	3,337	16,852
July	70,228	67,221	3,007	16,710
Aug.	68,994	66,385	2,609	16,968
Sept.	68,225	65,674	2,552	16,884
Oct.	68,513	66,005	2,508	16,767
Nov.	.....	.....	....	.....
Dec.	.....	.....	....	.....

1956 by Months

Jan.	65,775	62,891	2,885	16,852
Feb.	65,490	62,576	2,914	16,844
Mar.	65,913	63,078	2,834	16,781
Apr.	66,555	63,991	2,564	16,782
May	67,846	65,238	2,608	16,730
June	69,430	66,503	2,927	16,825
July	69,489	66,655	2,833	16,301
Aug.	68,947	66,752	2,195	17,035
Sept.	68,069	66,071	1,998	17,119
Oct.	68,082	66,174	1,909	17,238
Nov.	67,732	65,269	2,463	17,180
Dec.	67,029	64,550	2,479	17,159
1956 Avg .	67,530	64,979	2,551	16,905

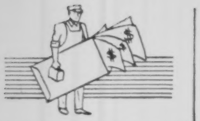
1955 by Months

Jan.	63,497	60,150	3,347	15,932
Feb.	63,321	59,938	3,383	16,064
Mar.	63,654	60,477	3,176	16,205
Apr.	64,647	61,685	2,962	16,262
May	65,192	62,703	2,489	16,343
June	66,696	64,016	2,679	16,589
July	67,465	64,994	2,471	16,485
Aug. ...	67,726	65,488	2,237	16,822
Sept.	66,882	64,733	2,149	16,918
Oct.	67,292	65,161	2,131	17,013
Nov.	67,206	64,807	2,398	17,064
Dec.	66,592	64,165	2,427	17,044
1955 Avg .	65,847	63,193	2,654	16,563

MONTHLY AVERAGES

1954	64,468	61,238	3,230	15,995
1953	63,815	62,213	1,602	17,238
1952	62,966	61,293	1,673	16,334
1951	62,884	61,005	1,879	16,104
1950	63,099	59,957	3,142	14,967
1949	62,105	58,710	3,395	14,178
1948	61,442	59,378	2,064	15,321
1947	60,168	58,027	2,142	15,290
1946	57,520	55,250	2,270	14,461
1945	53,860	52,820	1,040	15,302
1944	54,630	53,960	670	17,111
1943	55,540	54,470	1,070	17,381
1942	56,410	53,750	2,660	15,051

U. S. Departments of Commerce and Labor.



Labor

Labor Union Membership

Thousands of Members

Year	AFL-CIO	Independent or Unaffiliated Unions	Total
1957* ...	16,800	1,600	18,400
1956	16,753	1,573	18,326
1955	15,877	1,688	17,565

	American Federation of Labor	Congress of Industrial Organizations	Independent or Unaffiliated Unions	Total
1954	10,746	5,185	1,826	17,757
1953* ...	10,900	5,200	1,800	17,900
1952* ...	9,500	5,000	2,000–2,500	16,500–17,000
1951	9,500	5,000	2,000–2,500	16,500–17,000
1950	7,143	n.a.	2,400–2,800	14,000–16,000
1949	7,241	n.a.	2,000–2,300	14,000–16,000
1948	7,221	n.a.	2,200–2,500	14,000–16,000
1947	7,578	6,000	1,836	15,414
1946	7,152	6,000	1,822	14,974
1945	6,931	6,000	1,865	14,796
1944	6,807	5,935	1,879	14,621
1943	6,564	5,285	1,793	13,642
1942	5,483	4,195	1,084	10,762
1941	4,569	5,000	920	10,489
1940	4,247	3,625	1,072	8,944
1939	4,006	4,000	974	8,980
1938	3,623	4,038	604	8,265
1937	2,861	3,718	639	7,218
1936	3,422	....	742	4,164
1935	3,045	....	683	3,728
1934	2,608	....	641	3,249
1933	2,127	....	730	2,857
1932	2,532	....	694	3,226
1931	2,890	....	636	3,526
1930	2,961	....	671	3,632
1929	2,934	....	691	3,625
1928	2,896	....	671	3,567
1927	2,813	....	787	3,600
1926	2,804	....	788	3,592
1925	2,877	....	689	3,566
1924	2,866	....	683	3,549
1923	2,926	....	703	3,629
1922	3,196	....	754	3,950
1921	3,907	....	815	4,722
1920	4,079	....	955	5,034
1919	3,260	....	786	4,046
1918	2,726	....	642	3,368
1917	2,371	....	605	2,976
1916	2,073	....	649	2,722
1915	1,946	....	614	2,560
1914	2,021	....	626	2,647
1913	1,996	....	665	2,661
1912	1,770	....	635	2,405
1911	1,762	....	556	2,318
1910	1,562	....	554	2,116
1909	1,483	....	482	1,965
1908	1,587	....	505	2,092
1907	1,539	....	538	2,077
1906	1,454	....	438	1,892
1905	1,494	....	424	1,918
1904	1,676	....	391	2,067

*Estimated by STEEL.
n.a. = not available.
U. S. Department of Labor.

Labor Turnover

Rate Per 100 Employees in Manufacturing Industries

	SEPARATIONS									
	Quits		Discharges		Layoffs		Miscellaneous		Total	
	1957	1956	1957	1956	1957	1956	1957	1956	1957	1956
Jan.	1.3	1.4	0.2	0.3	1.5	1.7	0.3	0.2	3.3	3.6
Feb.	1.2	1.3	0.2	0.3	1.4	1.8	0.2	0.2	3.0	3.6
Mar.	1.3	1.4	0.2	0.3	1.4	1.6	0.2	0.2	3.3	3.5
Apr.	1.3	1.5	0.2	0.3	1.5	1.4	0.2	0.2	3.3	3.4
May	1.4	1.6	0.3	0.3	1.5	1.6	0.3	0.2	3.4	3.7
June	1.3	1.6	0.2	0.3	1.1	1.3	0.2	0.2	3.0	3.4
July	1.4	1.5	0.2	0.2	1.3	1.2	0.2	0.2	3.1	3.2
Aug. ...	1.9	2.2	0.3	0.3	1.6	1.2	0.3	0.2	4.0	3.9
Sept. ...	2.2	2.6	0.2	0.3	1.8	1.4	0.2	0.2	4.4	4.4
Oct.	1.3	1.7	0.2	0.3	2.3	1.3	0.2	0.2	4.0	3.5
Nov.	..	1.3	..	0.3	..	1.5	..	0.2	..	3.3
Dec.	..	1.0	..	0.2	..	1.4	..	0.2	..	2.8

ACCESSIONS

	1957	1956		1957	1956		1957	1956
Jan.	3.2	3.3	May	3.0	3.4	Sept.	3.3	4.1
Feb.	2.8	3.1	June	3.9	4.2	Oct.	2.8	4.2
Mar.	2.8	3.1	July	3.2	3.3	Nov.	..	3.0
Apr.	2.8	3.3	Aug.	3.2	3.8	Dec.	..	2.3

U. S. Department of Labor.

Wages and Hours in Selected Industries

(Production Workers)

Stamped and Pressed Metal Products

	EARNINGS (Hourly Avg)		HOURS (Weekly Avg)	
	1957	1956	1957	1956
Jan.	$2.24	$2.11	40.9	40.4
Feb.	2.23	2.14	40.8	40.9
Mar.	2.26	2.16	41.1	41.3
Apr.	2.26	2.15	40.6	41.1
May	2.28	2.16	40.9	40.2
June	2.32	2.20	41.2	41.3
July	...	2.21	...	41.2
Aug.	...	2.19	...	41.0
Sept.	...	2.27	...	42.4
Oct.	...	2.28	...	42.9
Nov.	...	2.27	...	42.4
Dec.	...	2.30	...	43.1

Metalworking Machinery

(Except Machine Tools)

	1957	1956	1957	1956
Jan. ..	$2.31	$2.24	42.3	43.9
Feb. ..	2.35	2.25	42.6	44.4
Mar. ..	2.36	2.24	42.6	44.0
Apr. ..	2.36	2.23	42.7	43.8
May ..	2.38	2.25	42.0	43.5
June ..	2.38	2.24	42.0	43.0
July	...	2.26	...	42.8
Aug.	...	2.25	...	41.8
Sept. ...	...	2.27	...	42.3
Oct.	...	2.30	...	42.7
Nov.	...	2.31	...	42.1
Dec. ..	...	2.33	...	43.3

Machine Tools

	1957	1956	1957	1956
Jan. ...	$2.39	$2.29	44.7	46.2
Feb. ...	2.39	2.28	44.8	46.1
Mar.	2.39	2.27	44.0	45.9
Apr.	2.39	2.29	43.7	46.2
May	2.39	2.30	42.8	46.0
June	2.40	2.30	42.4	45.4
July	...	2.29	...	45.1
Aug.	...	2.32	...	44.7
Sept. ...	...	2.37	...	46.0
Oct.	...	2.36	...	45.9
Nov.	...	2.38	...	45.3
Dec.	...	2.40	...	46.1

Fabricated Structural Metal Products

	1957	1956	1957	1956
Jan.	$2.18	$2.08	41.5	41.5
Feb.	2.18	2.07	41.8	41.3
Mar.	2.19	2.07	41.9	41.3
Apr.	2.20	2.08	41.8	41.8
May	2.21	2.09	42.1	41.7
June	2.22	2.10	42.3	41.9
July	...	2.09	...	41.1
Aug.	...	2.14	...	40.5
Sept. ...	...	2.16	...	41.7
Oct.	...	2.17	...	42.0
Nov.	...	2.17	...	41.6
Dec.	...	2.18	...	42.3

U. S. Department of Labor.

Agricultural Machinery and Tractors

	EARNINGS (Hourly Avg)		HOURS (Weekly Avg)	
	1957	1956	1957	1956
Jan.	$2.26	$2.16	39.8	40.8
Feb.	2.27	2.15	39.6	40.6
Mar.	2.28	2.14	40.1	40.5
Apr.	2.27	2.14	39.9	40.0
May	2.27	2.13	40.2	39.9
June	2.29	2.14	40.0	40.0
July	...	2.15	...	39.6
Aug.	...	2.14	...	39.8
Sept. ...	...	2.22	...	39.4
Oct.	...	2.20	...	39.4
Nov.	...	2.21	...	39.4
Dec.	...	2.24	...	39.8

Automobiles

	1957	1956	1957	1956
Jan. ..	$2.43	$2.28	41.3	39.9
Feb. ..	2.41	2.28	41.2	38.4
Mar. ..	2.41	2.27	40.3	39.5
Apr.	2.39	2.28	39.4	39.9
May ..	2.40	2.28	39.1	37.6
June ..	2.45	2.31	40.1	38.3
July	...	2.33	...	39.9
Aug. ..	...	2.35	...	39.7
Sept. ..	...	2.45	...	40.6
Oct. ..	...	2.46	...	41.8
Nov. ..	...	2.48	...	42.8
Dec.	...	2.52	...	45.2

Aircraft and Parts

	1957	1956	1957	1956
Jan. ...	$2.33	$2.21	42.6	42.0
Feb.	2.33	2.21	42.3	42.0
Mar.	2.35	2.22	42.2	41.7
Apr.	2.36	2.25	42.0	41.7
May	2.33	2.26	40.6	41.8
June	2.35	2.27	40.8	41.7
July	...	2.29	...	41.9
Aug.	...	2.30	...	42.2
Sept. ...	...	2.31	...	42.3
Oct.	...	2.31	...	42.3
Nov.	...	2.32	...	42.4
Dec.	...	2.34	...	42.8

Gray Iron Foundries

	1957	1956	1957	1956
Jan.	$2.13	$2.04	39.9	40.8
Feb.	2.15	2.03	39.1	41.0
Mar.	2.15	2.04	38.6	41.0
Apr.	2.15	2.04	38.5	41.7
May ...	2.16	2.03	38.4	40.7
June	2.17	2.04	38.8	40.4
July	...	2.05	...	40.2
Aug.	...	2.06	...	40.7
Sept. ...	...	2.07	...	40.7
Oct.	...	2.10	...	40.4
Nov.	...	2.12	...	39.9
Dec.	...	2.15	...	41.3

Trade

METALWORKING FACTS AND FIGURES

1957-1956 By Months

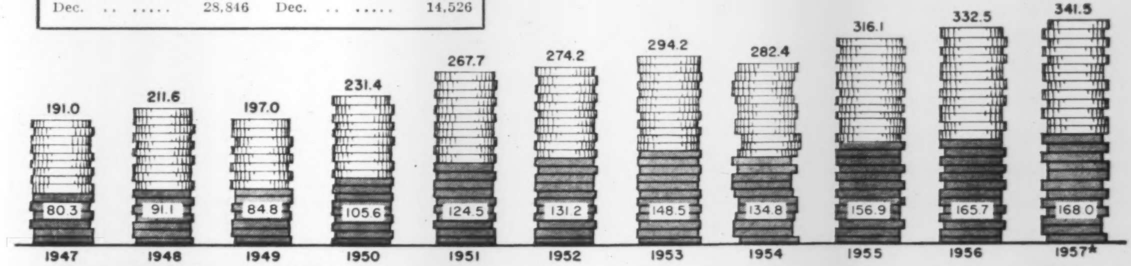
Millions of Dollars. Seasonally Adjusted

	All Manufacturing Industries			Durable Goods Industries	
	1957	1956		1957	1956
Jan.	29,956	27,585	Jan.	14,941	13,832
Feb.	29,534	27,685	Feb.	14,808	13,824
Mar.	28,426	26,848	Mar.	14,198	13,252
Apr.	28,679	27,520	Apr.	14,254	13,723
May	28,617	27,575	May	14,296	13,570
June	28,142	27,354	June	14,207	13,587
July	29,030	26,825	July	14,573	13,021
Aug.	28,638	27,588	Aug.	14,297	13,723
Sept.	28,215	27,146	Sept.	14,132	13,449
Oct.	28,003	28,696	Oct.	13,943	14,393
Nov.	.....	28,480	Nov.	.....	14,294
Dec.	.....	28,846	Dec.	.....	14,526

ANNUAL SALES TOTALS

(BILLIONS OF DOLLARS—NOT ADJUSTED FOR SEASONAL VARIATION)

Entire Bar=All Manufacturing Industries
Shaded Area=Durable Goods Industries
*Estimated
U. S. Office of Business Economics



Inventories at End of Month

Millions of Dollars. Seasonally Adjusted

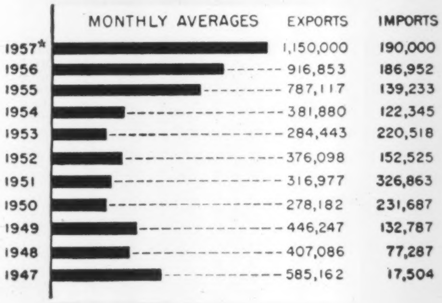
	All Manufacturing Industries		Durable Goods Industries	
	1957	1956	1957	1956
January	52,434	46,795	30,631	26,907
February	52,918	47,556	30,961	27,448
March	53,334	47,984	31,185	27,868
April	53,663	48,648	31,462	28,279
May	53,909	49,320	31,566	28,740
June	53,853	49,625	31,438	28,760
July	54,093	50,037	31,696	29,004
August	54,203	50,378	31,742	29,120
September	54,166	50,842	31,820	29,451
October	54,072	51,751	31,744	30,232
November	.....	52,210	.....	30,647
December	.....	52,295	.....	30,660

U. S. Office of Business Economics.

IRON & STEEL PRODUCTS

Exports and Imports

Excluding Advanced Manufactures—Net Tons



1957-1956 By Months

	Exports		Imports	
	1957	1956	1957	1956
January	1,023,053	793,976	213,757	144,677
February	1,027,568	905,604	184,434	130,869
March	1,425,854	916,793	188,476	134,967
April	1,314,350	918,221	180,119	141,590
May	1,283,605	1,008,246	187,645	177,702
June	1,211,497	914,645	161,607	162,642
July	1,163,485	701,488	216,489	168,926
August	1,116,940	710,271	197,862	225,631
September	1,046,440	908,956	......	178,934
October	......	1,140,215	......	255,122
November	....	923,148	......	296,827
December	....	1,160,670	......	225,532

U. S. Office of Business Economics. *Estimated.

Manufacturers' New Orders

Value—Millions of Dollars. Adjusted for Seasonal Variation

1957	Total Durables	Primary Metals	Fab. Metal Products	Mchy.	Transpin. Equip.	Other† Durables	Total Durables 1956	Total Durables 1955	Total Durables 1954
Jan.	14,176	2,345	1,468	4,246	3,282	2,835	14,449	12,404	9,097
Feb.	14,102	2,403	1,554	4,268	3,099	2,778	14,374	12,514	9,842
Mar.	13,853	2,330	1,398	4,205	3,236	2,684	13,771	13,538	9,534
Apr.	13,234	2,197	1,500	3,850	2,968	2,719	14,468	12,489	9,446
May	14,115	2,136	1,689	4,321	3,198	2,771	14,654	13,562	9,510
June	13,249	2,306	1,486	4,103	2,544	2,810	14,093	13,445	9,743
July	13,005	2,241	1,522	4,065	2,396	2,781	14,087	13,760	9,823
Aug.	13,160	2,078	1,372	4,124	2,884	2,702	17,342	15,113	10,262
Sept.	12,519	2,202	1,496	3,952	2,300	2,569	13,042	14,531	10,942
Oct.	12,350	2,065	1,513	3,939	2,248	2,585	14,312	14,506	11,103
Nov.	.....	....	....	....	....	....	15,776	15,288	10,856
Dec.	.....	....	....	....	....	....	14,543	15,251	11,784

† Includes ordnance, professional and scientific instruments, lumber, furniture, stone, clay and glass, and miscellaneous industries.
U. S. Office of Business Economics.

Foreign Trade

Value—Millions of Dollars

	Exports			Imports		
	1957	1956	1955	1957	1956	1955
Jan.	1,680.6	1,283.5	1,168.4	1,112.9	1,073.3	871.2
Feb.	1,609.1	1,361.5	1,237.8	992.8	1,051.2	849.9
Mar.	2,151.0	1,582.3	1,314.2	1,132.3	1,102.1	1,019.3
Apr.	1,864.0	1,511.7	1,263.9	1,117.8	991.1	871.1
May	1,813.7	1,714.4	1,323.0	1,104.1	1,093.6	959.3
June	1,781.5	1,690.2	1,320.5	982.6	1,033.4	936.8
July	1,690.6	1,620.0	1,269.3	1,144.7	1,050.7	885.3
Aug.	1,677.9	1,529.0	1,239.1	1,042.4	1,050.6	960.6
Sept.	1,541.2	1,523.0	1,254.2	1,008.0	992.8	947.1
Oct.	.....	1,659.1	1,398.3	.....	1,115.5	1,010.9
Nov.	.....	1,519.5	1,321.1	.....	984.3	1,064.9
Dec.	.....	1,993.1	1,406.8	.....	1,051.3	1,008.0

U. S. Bureau of the Census.

Monthly Averages

	Exports	Imports
1957*	1,715	1,055
1956	1,582	1,049
1955	1,296	949
1954	1,259	851
1953	1,314	906
1952	1,267	893
1951	1,253	914
1950	856	738
1949	1,004	552
1948	1,054	594
1947	1,278	480
1946	812	412
1945	817	347

*Estimated.

Iron and Steel Scrap

(Net Tons)

	Exports		Imports	
	1957	1956	1957	1956
Jan.	546,694	419,954	20,741	16,410
Feb.	619,576	529,847	19,571	13,980
Mar.	799,983	490,090	11,267	13,263
Apr.	667,859	480,170	8,295	11,576
May	671,916	574,915	14,645	13,914
June	502,030	531,516	15,644	10,214
July	490,930	438,908	18,042	13,102
Aug.	575,032	472,165	22,904	26,907
Sept.	587,212	545,470	.....	25,024
Oct.	......	683,537	.....	24,788
Nov.	.....	490,708	.....	25,607
Dec.	......	621,775	.....	28,753

U. S. Office of Business Economics.

Monthly Averages

	Exports	Imports
1957*	592,000	15,000
1956	523,255	18,628
1955	429,600	16,364
1954	140,218	17,195
1953	25,310	10,964
1952	28,464	8,825
1951	19,228	29,925
1950	18,080	61,483
1949	24,883	91,994
1948	20,308	36,226
1947	16,173	3,016
1946	12,424	2,519
1945	7,978	3,856

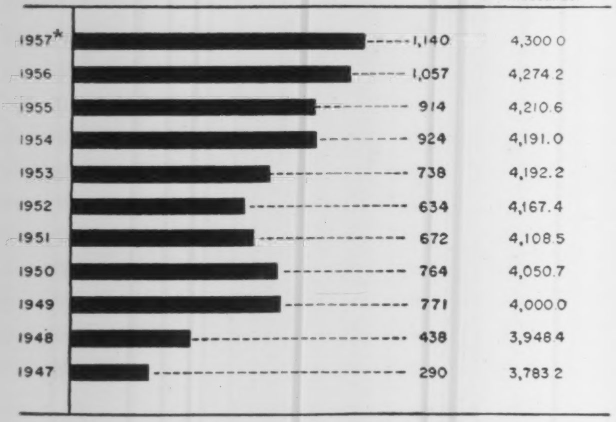
* Estimated.

Trade

METALWORKING FACTS AND FIGURES

BUSINESS FAILURES

Total Monthly Averages



Failures—Liabilities

	FAILURES			LIABILITIES	
	Total	Con-struction	Mfg., Mining	Con-struction	Mfg., Mining
1957					
January	1,148	177	197	$10,672,000	$14,443,000
February	1,146	180	199	8,440,000	33,402,000
March	1,336	205	239	10,424,000	17,760,000
April	1,175	172	190	9,090,000	16,286,000
May	1,200	181	205	10,820,000	14,888,000
June	1,084	164	179	10,066,000	12,966,000
July	1,059	153	181	7,629,000	14,039,000
August	1,145	165	204	10,426,000	12,847,000
September	1,071	164	182	5,618,000	13,901,000
October	1,122	176	214	7,994,000	11,601,000
November	....	...	...	....	....
December	....	...	...	....	....

Monthly Averages

	Total	Con-struction	Mfg., Mining	Con-struction	Mfg., Mining
1957*	1,140	...	...	....	....
1956	1,072	153	190	$8,400,250	$15,935,833
1955	914	117	184	6,931,583	13,078,750
1954	924	109	190	4,735,750	14,273,667
1953	738	85	155	3,610,583	13,237,833
1952	634	70	132	3,012,083	8,746,167
1951	672	80	128	3,123,000	7,581,000
1950	764	76	173	2,138,000	7,925,000
1949	771	70	194	2,270,000	11,939,000
1948	438	37	123	1,301,000	10,858,000
1947	290	20	106	601,000	11,894,000

Dun & Bradstreet Inc.

*Estimated.

Businesses in Operation

(In Thousands at Beginning of Half)

	Total	Contract Construction	Manufac-turing	Service
1957*	4,300.0	....	....	....
1st Half	4,301.0	475.0	307.0	754.0
2nd Half	....	....	....	....
1956 (Avg)	4,274.2	474.3	309.3	748.8
1st Half	4,247.5	468.7	308.7	745.7
2nd Half	4,301.0	480.0	310.0	754.0

YEARLY TOTALS

	Total	Contract Construction	Manufac-turing	Service
1955	4,210.6	455.8	311.9	742.8
1954	4,191.0	436.3	319.7	740.6
1953	4,192.2	425.0	326.7	740.4
1952	4,167.4	411.0	328.8	739.5
1951	4,108.5	388.6	327.2	735.5
1950	4,050.7	370.5	320.7	735.6
1949	4,000.0	347.5	320.5	736.8
1948	3,948.4	329.0	320.0	738.3
1947	3,783.2	292.6	312.0	711.5
1946	3,487.2	243.8	285.9	656.5
1945	3,113.9	176.8	258.4	591.5
1944	2,916.5	153.3	250.2	551.8

*Estimated by STEEL.
U. S. Office of Business Economics.

New Business Incorporations

	1957	1956	1955	1954	1953
January	13,387	13,363	13,181	9,543	9,468
February	10,791	12,503	11,369	8,533	7,943
March	12,049	12,822	13,417	10,514	9,659
April	12,312	12,475	11,756	10,272	9,507
May	12,220	13,142	12,029	9,280	8,968
June	11,269	11,952	12,605	9,748	8,926
July	11,686	11,513	10,893	9,409	8,703
August	11,361	11,339	10,983	9,041	7,487
September	10,526	9,583	11,024	9,256	7,433
October	11,251	11,546	10,698	9,852	8,267
November	.....	9,749	10,157	9,735	7,269
December	.....	10,788	11,539	11,981	8,915
Totals	.....	140,775	139,651	117,164	102,545
Monthly Avg	11,685	11,731	11,638	9,764	8,545

Dun & Bradstreet Inc.

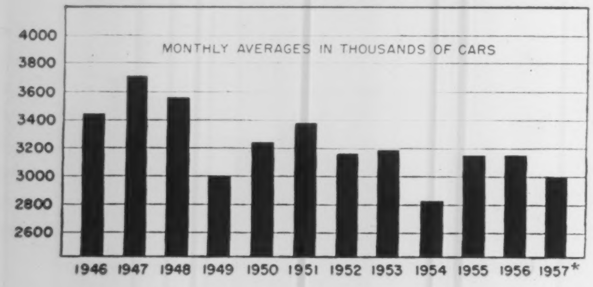
Discontinued Businesses

(Thousands)

	Total	Contract Construction	Manufac-turing	Service
1957*	330.0			
1956	327.0	58.0	29.0	55.0
1955	310.9	40.4	30.0	52.3
1954	330.6	46.8	32.1	51.6
1953	234.0	50.7	31.5	52.6
1952	306.3	45.5	29.1	50.8
1951	309.3	46.7	26.4	54.2
1950	289.6	39.2	24.7	57.8

*Estimated by STEEL.
U. S. Office of Business Economics.

FREIGHT CARLOADINGS



1957—By Weeks

Jan. 5	561,519	May 11	723,392	Sept. 7	646,118
Jan. 12	680,766	May 18	722,521	Sept. 14	741,147
Jan. 19	657,269	May 25	722,903	Sept. 21	724,934
Jan. 26	665,745	June 1	671,785	Sept. 28	739,266
Feb. 2	647,972	June 8	733,477	Oct. 5	747,647
Feb. 9	665,251	June 15	746,125	Oct. 12	741,520
Feb. 16	675,966	June 22	746,764	Oct. 19	726,812
Feb. 23	626,636	June 29	732,349	Oct. 26	703,688
Mar. 2	703,984	July 6	535,334	Nov. 2	713,994
Mar. 9	672,386	July 13	691,991	Nov. 9	675,273
Mar. 16	689,226	July 20	743,359	Nov. 16	647,298
Mar. 23	685,833	July 27	736,407	Nov. 23	632,763
Mar. 30	694,922	Aug. 3	740,711	Nov. 30	553,722
Apr. 6	644,092	Aug. 10	740,471	Dec. 7	......
Apr. 13	673,964	Aug. 17	750,640	Dec. 14	......
Apr. 20	686,950	Aug. 24	759,140	Dec. 21	......
Apr. 27	690,789	Aug. 31	745,183	Dec. 28	......
May 4	718,924				

Association of American Railroads.

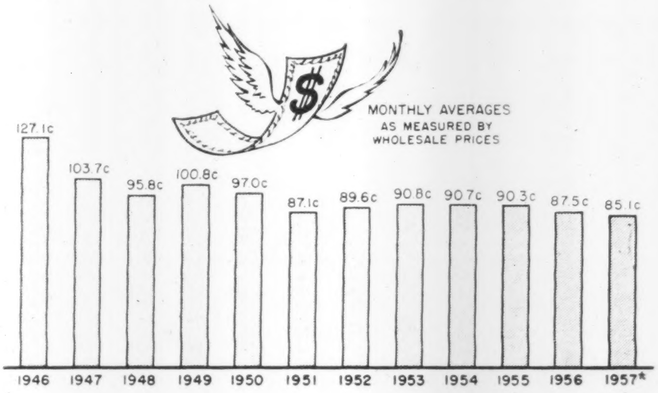
*Estimated.

Finance

METALWORKING FACTS AND FIGURES

PURCHASING POWER OF THE DOLLAR

(1947-49=100)



AS MEASURED BY:

	Wholesale Prices	Consumers' Prices	Retail Food Prices
1957			
Jan.	85.5	84.6	88.7
Feb.	85.5	84.2	88.0
Mar.	85.5	84.1	88.3
Apr.	85.3	83.8	87.9
May	85.4	83.6	87.3
June	85.2	83.2	86.1
July	84.6	82.8	85.2
Aug.	84.5	82.6	....
Sept.	84.7	82.6	....
Oct.	85.0	82.6	....
Nov.	....	....	....
Dec.	....	....	....
Monthly Averages			
1956	87.5	86.1	89.5
1955	90.3	87.3	90.2
1954	90.7	87.1	88.8
1953	90.8	87.4	88.7
1952	89.6	88.1	87.3
1951	87.1	90.1	88.8
1950	97.0	97.3	98.8
1949	100.8	98.2	100.0
1948	95.8	97.3	96.1
1947	103.7	104.7	104.3

*Estimated.
U. S. Office of Business Economics.

National Income

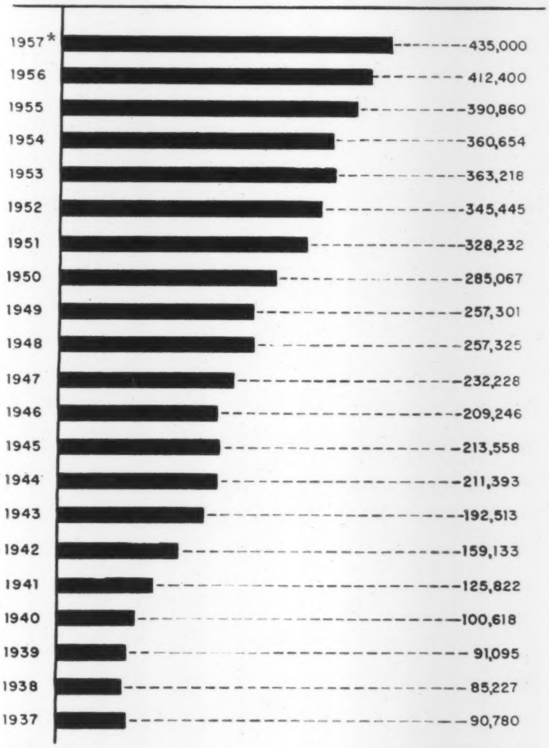
(Millions of Dollars)

1957*.	358,000
1956..	343,620
1955..	324,068
1954..	298,955
1953..	302,129
1952..	290,177
1951..	277,041
1950..	239,956
1949..	216,193
1948..	221,641
1947..	197,168
1946..	179,577
1945..	181,248
1944..	182,639
1943..	170,310
1942..	137,694
1941..	104,710
1940..	81,634
1939..	72,753
1938..	67,581
1937..	73,618
1936..	64,911

*Estimated.
Dept. of Com.

GROSS NATIONAL PRODUCT

(Millions of Dollars)



*Estimated.

Department of Commerce.

U. S. Revenues, Expenditures, Debt

Year	Net Receipts (millions)	Per Capita Receipts	Expenditures (millions)	Per Capita Expenditures	Gross Debt (millions)	Per Capita Debt
1957....	$70,991	$415.20	$69,344	$405.57	$270,527	$1582.21
1956....	68,165	406.09	66,539	396.40	272,751	1624.89
1955....	60,389	365.89	64,568	391.21	274,374	1662.41
1954....	64,654	398.64	67,772	417.86	271,260	1672.51
1953....	64,596	405.19	73,985	464.08	266,071	1668.10
1952....	62,129	396.31	66,146	421.93	259,105	1652.77
1951....	48,142	312.36	44,632	289.59	255,222	1655.97
1950....	37,043	244.42	40,167	265.03	257,357	1698.13
1949....	38,246	256.68	40,057	268.83	252,770	1696.44
1948....	44,746	306.24	36,326	248.61	252,292	1726.68
1947....	44,703	311.77	42,505	296.44	258,376	1801.94
1946....	43,037	305.25	65,018	461.17	269,422	1910.97
1945....	46,456	332.78	100,404	719.25	258,682	1853.01
1944....	44,149	319.92	93,743	679.29	201,003	1455.52
1943....	22,281	163.25	78,182	572.83	136,696	1001.55
1942....	12,799	95.25	32,491	241.80	72,422	537.35
1941....	7,607	57.29	12,774	74.16	48,961	367.54
1940....	5,387	44.09	9,127	70.65	42,967	325.63
1939....	5,164	43.21	8,765	70.65	40,445	308.34
1938....	5,854	47.89	7,304	59.70	37,167	285.43
1937....	5,028	40.93	8,281	62.69	36,427	281.82
1936....	4,115	32.17	9,068	69.41	33,545	261.20
1935....	3,800	29.88	7,583	58.00	28,701	225.07
1934....	3,115	24.64	6,370	56.19	27,053	213.65
1933....	2,079	16.54	4,325	40.91	22,538	179.21
1932....	2,005	16.06	4,948	41.28	19,487	155.93
1931....	3,190	25.70	4,091	32.99	16,801	135.37
1930....	4,177	33.01	3,994	32.42	16,185	131.49
1929....	4,033	33.19	3,848	31.67	16,931	139.40
1928....	4,042	33.73	3,643	30.40	17,604	146.69
1927....	4,129	34.94	3,493	29.56	18,510	156.04
1926....	3,962	33.98	3,584	30.76	19,643	167.70
1925....	3,780	32.91	3,529	30.73	20,516	177.82
1924....	4,012	35.44	3,507	30.98	21,251	186.86
1923....	4,007	35.93	3,697	33.15	22,349	200.10
1922....	4,109	37.40	3,795	34.54	22,964	208.97

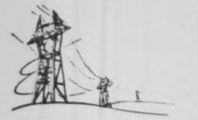
Annual Statements of the Treasury.

Corporate Income, Taxes, Dividends

(All Industries—Millions of Dollars)

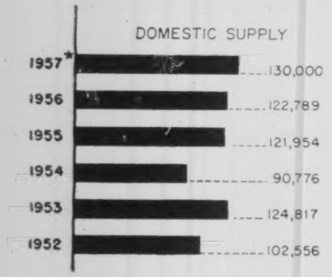
	Income Before Taxes	Taxes†	Income After Taxes	Dividend Payments	Undistributed Income
1957					
1st Qtr. ...	43,900§	22,400§	21,500§	1,804	.....
2nd Qtr. ...	42,000§	21,400§	20,500§	1,817	.....
1956	43,008	21,959	21,049	11,874	9,175
1955	42,473	21,520	20,953	11,048	9,905
1954	33,452	17,429	16,023	9,874	6,149
1953	37,039	20,304	16,735	9,310	7,425
1952	35,936	19,788	16,148	9,000	7,148
1951	41,173	22,476	18,697	9,090	9,607
1950	39,970	17,829	22,141	9,207	12,934
1949	26,198	10,411	15,787	7,458	8,329

†Federal and state corporate income and excess profits tax liability.
§Seasonally adjusted quarterly totals at annual rates.
Department of Commerce.



IRON ORE SUPPLY (Exclusive of stocks on hand)

Thousands of Gross Tons



Gross Tons

1957	U. S. Mine Production	Imports	Exports	Total Domestic Supply
Jan.	3,840,977	1,691,591	83,547	5,449,021
Feb.	3,560,384	1,357,425	93,712	4,824,097
Mar.	3,717,126	1,458,222	105,234	5,070,114
Apr.	6,676,532	1,800,720	152,055	8,325,197
May	12,586,928	3,186,847	661,444	15,112,331
June	14,439,683	3,626,253	899,571	17,166,365
July	14,303,003	4,402,791	871,754	17,834,040
Aug.	14,370,150	3,933,322	914,098	17,389,374
Sept.	....	....	......	....
Oct.	....	....	......	....
Nov.	....	....	......	....
Dec.	....	....	......	....
1956	97,848,936	30,431,152	5,491,176	122,788,912
1955	102,998,969	23,471,956	4,516,828	121,969,447

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*Estimated.
U. S. Bureau of Mines.

Iron Ore Stocks†

At Furnaces and Docks in U. S.
Gross Tons

	1957	1956
Jan.	55,235,619	n.a.
Feb.	46,774,499	n.a.
Mar.	39,467,434	n.a.
Apr.	30,797,107	28,700,576
May	25,926,204	24,977,360
June	31,716,821	30,131,992
July	39,168,711	37,579,858
Aug.	47,647,670	n.a.
Sept.	55,506,534	45,354,440
Oct.	61,843,964	50,974,181
Nov.	68,444,911	57,497,963
Dec.	....	60,391,407

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†On first day of month.
n.a.=not available.
American Iron Ore Association and American Iron & Steel Institute.

Lake Superior Iron Ore

Shipments from Upper Lake Ports
Gross Tons

	1957	1956	1955
Jan.	none	none	none
Feb.	none	none	none
Mar.	none	none	none
Apr.	3,986,614	5,674,112	3,758,006
May	12,727,659	12,553,857	11,605,747
June	13,597,376	12,939,316	12,595,259
July	14,211,819	2,665,548	13,334,308
Aug.	13,172,356	8,045,028	13,572,266
Sept.	11,827,858	12,745,097	12,756,566
Oct.	11,005,297	12,628,477	12,243,518
Nov.	4,066,257	8,801,168	7,409,793
Dec.	19,498	1,580,424	184,390
Totals	84,614,734	77,633,027	87,459,853

American Iron Ore Association.

Iron Ore Consumption in U. S.†

Gross Tons

	1957	1956
Jan.	11,525,704	n.a.
Feb.	10,441,687	n.a.
Mar.	11,295,587	n.a.
1st Qtr.	....	33,094,769
Apr.	10,686,969	10,559,680
May	10,938,663	10,874,506
June	10,451,125	10,083,749
July	10,655,416	n.a.
Aug.	10,903,792	9,933,939
Sept.	10,481,434	10,939,492
Oct.	10,272,452	11,517,710
Nov.	....	11,141,823
Dec.	....	11,523,973

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†Includes ore agglomerates.
n.a.=not available.
American Iron Ore Association.

Fluorspar

Net Tons

1957	Production	Imports	Consumption	Stocks†
1st Qtr.	62,147	111,339	166,563	169,941

YEARLY TOTALS

	Production	Imports	Consumption	Stocks†
1956	253,800	485,552	621,354	208,751
1955	239,500	363,420	570,261	164,016
1954	247,700	293,320	480,374	170,183
1953	322,700	361,219	586,798	259,407
1952	345,400	353,503	520,197	279,657
1951	341,300	181,275	497,012	182,409
1950	283,500	164,634	426,121	183,723

U. S. Bureau of Mines. †End of period.

Coke Production

Net Tons

	Oven	Beehive	Totals
1957*	....	....	75,000,000
Jan.	6,604,384	253,256	6,857,640
Feb.	5,965,912	245,933	6,211,845
Mar.	6,631,662	262,459	6,894,121
Apr.	6,221,182	215,091	6,436,273
May	6,451,371	181,148	6,632,519
June	6,207,022	155,313	6,362,335
July	6,364,026	137,240	6,501,266
Aug.	6,369,395	148,665	6,518,060
Sept.	6,160,642	136,011	6,296,653
Oct.	....	......	....
Nov.	....	......	....
Dec.	....	......	....
1956	71,936,499	2,443,957	74,380,456
Jan.	6,660,922	259,848	6,920,770
Feb.	6,234,670	248,068	6,482,738
Mar.	6,625,374	273,228	6,898,602
Apr.	6,379,919	251,314	6,631,233
May	6,467,080	259,498	6,726,578
June	6,019,849	215,640	6,235,489
July	2,252,847	51,883	2,304,730
Aug.	5,496,368	119,226	5,615,594
Sept.	6,299,189	154,040	6,453,229
Oct.	6,556,074	186,409	6,742,483
Nov.	6,328,272	204,854	6,533,126
Dec.	6,615,935	219,949	6,835,884

YEARLY TOTALS

	Oven	Beehive	Totals
1957*	....	....	75,000,000
1956	71,936,499	2,443,957	74,380,456
1955	73,584,214	1,717,612	75,301,826
1954	59,061,442	601,054	59,662,496
1953	73,593,528	5,243,329	78,836,857
1952	63,850,115	4,403,994	68,254,109
1951	71,987,172	7,343,530	79,330,702
1950	66,890,618	5,827,420	72,718,038
1949	60,222,481	3,414,948	63,637,429

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*Estimated.
U. S. Bureau of Mines.

Iron & Steel Scrap

Thousands of Net Tons

	Consumption		Stocks†	
	1957	1956	1957	1956
Jan.	7,427	7,492	7,312	7,141
Feb.	6,763	7,107	7,306	7,168
Mar.	7,049	7,541	7,361	6,863
Apr.	6,514	7,270	7,376	6,737
May	6,444	7,271	7,307	7,054
June	6,082	6,714	7,309	6,934
July	5,485	2,225	7,866	7,013
Aug.	5,935	6,108	8,393	7,027
Sept.	5,638	6,979	8,895	6,786
Oct.	....	7,529	....	6,923
Nov.	....	7,063	....	6,958
Dec.	....	7,017	....	7,416

MONTHLY AVERAGES

Consumption		Consumers' Stocks†	
1957*	6,125	1957*	7,970
1956	6,693	1956	7,002
1955	6,781	1955	7,259
1954	5,113	1954	6,689
1953	6,442	1953	6,738
1952	5,752	1952	6,103
1951	6,395	1951	4,472
1950	5,742	1950	5,272
1949	4,528	1949	5,631
1948	5,414	1948	4,980
1947	5,072	1947	3,966

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†End of month. *Estimated.
U. S. Bureau of Mines.

Scrap Consumption by Industries

Thousands of Net Tons

	Makers of Steel Ingots and Castings[1]		Makers of Steel Castings[2]		Iron Foundries and Misc.		Totals†	
	1957	1956	1957	1956	1957	1956	1957	1956
Jan.	6,063	6,073	324	316	1,040	1,102	7,427	7,492
Feb.	5,510	5,685	299	325	954	1,097	6,763	7,107
Mar.	5,773	6,110	307	336	970	1,095	7,049	7,541
Apr.	5,208	5,902	311	324	995	1,044	6,514	7,270
May	5,166	5,893	306	351	972	1,027	6,444	7,271
June	4,925	5,458	278	317	880	939	6,082	6,714
July	4,496	1,238	221	232	769	755	5,485	2,225
Aug.	4,758	4,827	285	324	892	958	5,935	6,108
Sept.	....	5,803	...	290	....	885	....	6,979
Oct.	....	6,129	...	338	....	1,062	....	7,529
Nov.	....	5,773	...	314	....	976	....	7,063
Dec.	....	5,816	...	286	....	915	....	7,017

[1] Includes only those castings made by companies producing steel ingots.
[2] Excludes companies that produce both steel castings and steel ingots.
†Totals are not precise because of rounded figures.
U. S. Bureau of Mines.

Refractories†

(Shipments in Thousands of Dollars)

1957	Clay Refractories	Nonclay Refractories	Total Refractories
1st Qtr.	56,340	69,255	125,595
2nd Qtr.	52,730	61,136	113,866
1956	208,608	210,764	419,372
1955	181,076	188,276	369,352
1954	129,086	127,621	256,707
1953	159,663	164,704	324,367
1952	161,092	139,154	300,246
1951	171,086	155,756	326,842
1950	126,686	111,971	238,657
1949	102,144	82,027	184,171

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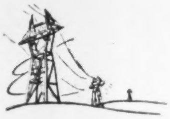
†Yearly figures do not include dead-burned magnesia and magnesite or dead-burned dolomite.
U. S. Bureau of the Census.



Fuel-Power-Raw Materials

METALWORKING FACTS AND FIGURES

U. S. Electricity Production Capacity

Thousands of Kilowatts

1957			
January	121,205	July	124,993
February	121,326	August	125,754
March	121,783	September	126,240
April	122,271	October	......
May	122,795	November	......
June	124,428	December	......

CAPACITIES AT YEAREND

1956	120,435	1952	82,226	1948	56,560
1955	114,472	1951	75,775	1947	52,322
1954	102,592	1950	68,919	1946	50,317
1953	91,502	1949	63,100	1945	50,111

Edison Electric Institute.

Liquefied Petroleum Gas Consumption in Steel Industry

Gallons

	Heating and Annealing	All Other	Total
1956	9,157,271	2,452,896	11,610,167
1955	10,705,474	1,595,174	12,300,648
1954	6,700,742	874,980	7,575,722

American Iron & Steel Institute.

Fuel Oil Consumption in Steel Industry

Thousands of Gallons

	Melting Furnaces	Heating, Annealing, etc.	Total
1956	1,540,835	720,794	2,261,629
1955	1,584,752	693,090	2,277,842
1954	1,239,305	558,989	1,798,294
1953	1,708,471	684,745	2,393,216
1952	1,579,960	660,165	2,240,125
1951	1,781,660	742,050	2,523,710
1950	1,618,723	675,481	2,294,204

American Iron & Steel Institute.

ELECTRICITY OUTPUT

By Plants Contributing to Public Supply
Millions of Kilowatt-Hours

1957—By Weeks

Jan.	5	11,671	May	4	11,286	Sept.	7	11,678
Jan.	12	12,327	May	11	11,311	Sept.	14	11,947
Jan.	19	12,556	May	18	11,519	Sept.	21	11,991
Jan.	26	12,410	May	25	11,574	Sept.	28	11,697
Feb.	2	12,322	June	1	10,936	Oct.	5	11,564
Feb.	9	12,019	June	8	11,550	Oct.	12	11,709
Feb.	16	11,946	June	15	11,958	Oct.	19	11,684
Feb.	23	11,920	June	22	12,337	Oct.	26	11,787
Mar.	2	11,791	June	29	12,111	Nov.	2	11,860
Mar.	9	11,867	July	6	11,056	Nov.	9	11,914
Mar.	16	11,650	July	13	11,964	Nov.	16	11,953
Mar.	23	11,723	July	20	12,306	Nov.	23	12,136
Mar.	30	11,694	July	27	12,243	Nov.	30	11,613
Apr.	6	11,693	Aug.	3	12,474	Dec.	7	.....
Apr.	13	11,695	Aug.	10	12,070	Dec.	14	.....
Apr.	20	11,485	Aug.	17	12,409	Dec.	21	.....
Apr.	27	11,310	Aug.	24	12,023	Dec.	28	.....
			Aug.	31	12,147			

Edison Electric Institute.

YEARLY TOTALS

Millions of Kilowatt-Hours

1957*	638,400
1956	600,592
1955	547,038
1954	471,686
1953	412,665
1952	399,224
1951	370,673
1950	329,141
1949	291,100
1948	282 698
1947	255,739

*Estimated.
Federal Power Commission.

Industrial Coal Stocks

(Bituminous)
Thousands of Net Tons at End of Month

	1957	1956		1957	1956
Jan.	72,135	64,852	July	74,106	70,371
Feb.	70,501	64,394	Aug.	76,672	73,149
Mar.	71,320	65,194	Sept.	78,803	74,951
Apr.	72,684	66,536	Oct.	......	77,706
May	75,324	70,965	Nov.	......	77,806
June	77,369	72,695	Dec.	......	76,886

U. S. Bureau of Mines.

Natural Gas Consumption in Steel Industry

Millions of Cubic Feet

	Melting Furnaces	Heating, Annealing	All Other	Total
1956	57,434	154,855	57,288	269,577
1955	55,354	161,157	50,091	266,602
1954	40,302	194,888	44,869	280,059
1953	44,765	139,339	39,794	223,898
1952	40,096	125,842	43,051	208,989
1951	44,669	126,380	35,748	206,797
1950	44,398	128,205	31,249	203,852

American Iron & Steel Institute.

Natural Gas Sales

Millions of Therms

1957	Residential	Industrial, Commercial	Other	Total
1st Qtr.	10,308	11,826	918	23,052
2nd Qtr.	5,125	11,030	743	16,898
1956	22,255	43,798	2,297	68,350
1955	20,086	40,135	3,117	63,338

American Gas Association.

Oxygen Production and Use

(Millions of Cubic Feet)

	U. S. Production	Steel Industry Consumption
1956	49,300	23,901

American Iron & Steel Institute.

Bituminous Coal Consumption

Thousands of Net Tons

	Industrial Consumption		Retail Deliveries		Total	
	1957	1956	1957	1956	1957	1956
Jan.	37,037	37,592	5,773	7,881	42,810	45,473
Feb.	31,778	34,231	4,214	6,990	35,992	41,221
Mar.	33,703	35,124	3,578	5,997	37,281	41,121
Apr.	30,750	31,900	2,619	4,186	33,369	36,086
May	30,534	31,499	1,674	2,976	32,208	34,475
June	29,268	29,862	1,502	2,005	30,770	31,867
July	29,280	22,649	1,530	1,951	30,810	24,600
Aug.	30,769	29,557	2,119	2,802	32,888	32,359
Sept.	29,759	30,035	2,543	3,195	32,302	33,230
Oct.	.....	32,748	....	3,521	.....	36,269
Nov.	.....	33,462	....	3,648	.....	37,110
Dec.	.....	34,980	....	3,973	.....	38,953

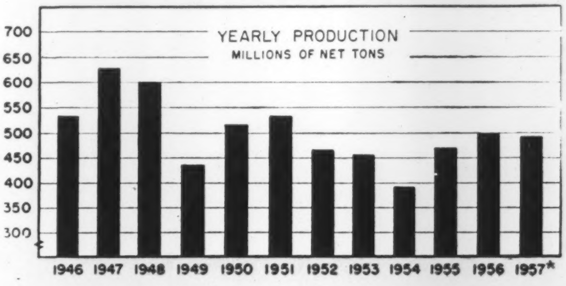
U. S. Office of Business Economics.

Monthly Averages

	Industrial Consumption	Retail Deliveries	Total
1956	31,970	4,094	36,064
1955	30,804	4,480	35,284
1954	25,869	4,385	30,254
1953	30,459	5,108	35,567
1952	29,197	5,699	34,896
1951	32,698	6,378	39,075
1950	30,633	7,217	37,850
1949	29,603	7,525	37,128
1948	35,847	7,479	43,326

U. S. Bureau of Mines.

BITUMINOUS COAL OUTPUT



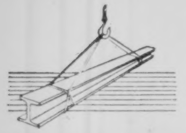
1957—By Weeks

Thousands of Net Tons

Jan.	5	7,145	May	4	9,570	Sept.	7	8,580
Jan.	12	10,250	May	11	9,085	Sept.	14	10,100
Jan.	19	9,925	May	18	9,605	Sept.	21	10,065
Jan.	26	10,170	May	25	9,565	Sept.	28	10,255
Feb.	2	8,775	June	1	8,900	Oct.	5	9,950
Feb.	9	9,725	June	8	10,020	Oct.	12	9,910
Feb.	16	9,750	June	15	10,335	Oct.	19	9,830
Feb.	23	9,850	June	22	10,395	Oct.	26	9,880
Mar.	2	9,660	June	29	9,040	Nov.	2	9,820
Mar.	9	9,700	July	6	1,500	Nov.	9	9,400
Mar.	16	10,225	July	13	7,550	Nov.	16	9,120
Mar.	23	10,340	July	20	9,940	Nov.	23	9,320
Mar.	30	10,570	July	27	10,010	Nov.	30	8,095
Apr.	6	8,320	Aug.	3	9,750	Dec.	7	.....
Apr.	13	9,900	Aug.	10	9,620	Dec.	14	.....
Apr.	20	10,200	Aug.	17	9,600	Dec.	21	.....
Apr.	27	10,000	Aug.	24	9,950	Dec.	28	.....
			Aug.	31	10,060			

U. S. Bureau of Mines.

*Estimated.



Construction

CONSTRUCTION VALUATION

Thousands of Dollars

	Totals 1957	Totals 1956	Public Works, Utilities 1957	Public Works, Utilities 1956	Residential and Nonresidential 1957	Residential and Nonresidential 1956
Jan.	2,299,554	2,221,074	568,820	624,547	1,730,734	1,596,527
Feb.	2,161,009	2,229,498	465,485	534,559	1,695,524	1,694,939
Mar.	3,077,977	2,769,506	878,268	519,251	2,199,729	2,250,255
Apr.	2,776,431	3,045,467	706,699	653,303	2,069,732	2,392,164
May	3,399,528	2,980,200	982,683	662,937	2,416,845	2,317,263
June	3,243,486	2,947,483	901,989	720,976	2,341,497	2,226,507
July	2,900,681	3,013,034	653,086	795,514	2,247,595	2,217,520
Aug.	2,817,966	2,953,309	526,188	795,589	2,291,778	2,157,720
Sept.	2,624,928	2,575,122	532,770	597,535	2,092,158	1,977,587
Oct.	2,613,791	2,442,960	538,192	528,318	2,075,599	1,914,642
Nov.	....	2,377,306	......	507,980	....	1,869,326
Dec.	....	2,057,237	......	601,643	....	1,455,594
Totals ...	32,150,000*	31,612,196	......	7,542,152	....	24,070,044

F. W. Dodge Corp.

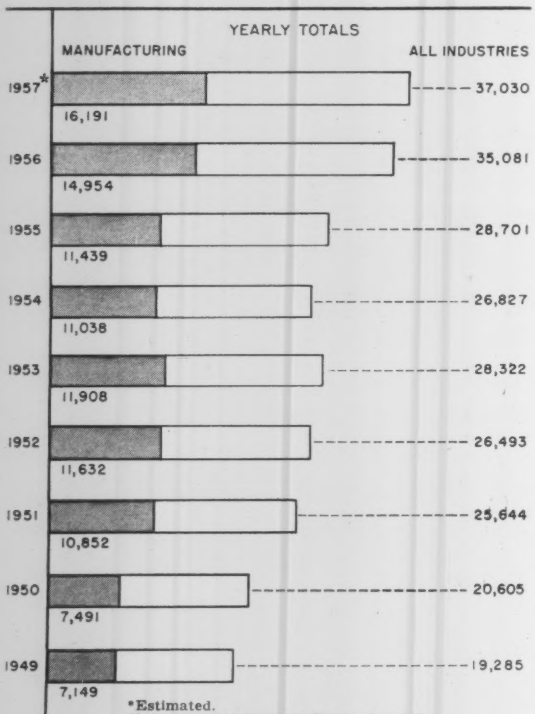
*Estimated.

NEW PLANT & EQUIPMENT EXPENDITURES

Millions of Dollars

(Figures do not necessarily add to totals, due to rounding.)

	Manufacturing 1957	Manufacturing 1956	All Industries 1957	All Industries 1956
1st Quarter	3,505	2,958	8,282	7,462
2nd Quarter	4,183	3,734	9,590	8,880
3rd Quarter	4,414	3,834	9,957	8,901
4th Quarter	4,089*	4,428	9,201*	9,838
Totals	16,191*	14,954	37,030*	35,081



*Estimated.
U. S. Office of Business Economics and Securities & Exchange Commission.

CONSTRUCTION PUT IN PLACE

(Millions of Dollars)

	TOTALS	PRIVATE Nonfarm Residential	PRIVATE Nonresidential	PRIVATE Farm	PRIVATE Public Utility	PRIVATE All Other	PUBLIC
1957							
11 Mo..	43,621	15,280	8,370	1,450	5,295	183	13,043
Jan. ..	3,182	1,137	722	91	350	11	871
Feb. ..	3,000	1,048	704	96	357	12	783
Mar. ..	3,280	1,167	709	105	398	13	888
Apr. ..	3,641	1,300	713	119	432	15	1,062
May ..	4,033	1,410	747	140	493	18	1,225
June ..	4,347	1,526	786	156	517	19	1,343
July ..	4,395	1,556	774	166	526	17	1,356
Aug. ..	4,595	1,569	805	171	553	19	1,478
Sept. ..	4,567	1,565	802	159	560	18	1,463
Oct. ..	4,467	1,528	806	133	570	20	1,410
Nov. ..	4,114	1,474	802	114	539	21	1,164
Dec. ..	....	....	....	....	....	..	....
1956 ...	44,258	15,339	8,801	1,500	5,065	120	13,433
1955 ...	42,991	16,595	7,612	1,600	4,604	161	12,419

U. S. Departments of Commerce and Labor.

NEW HOUSES STARTED

(Permanent Nonfarm Dwellings—Cost Estimated in Thousands of Dollars)

	Number 1957	Number 1956	Cost 1957	Cost 1956
January	63,000	75,100	$718,318	$814,448
February	65,800	78,400	762,871	887,138
March	87,000	98,600	1,058,827	1,149,101
April	93,700	111,400	1,115,826	1,309,175
May	103,000	113,700	1,279,400	1,346,513
June	99,900	107,400	1,181,460	1,268,496
July	99,900	101,100	1,165,740	1,201,352
August	95,000	103,900	....	1,227,269
September	90,000	93,900	....	1,106,183
October	95,000	93,600	....	1,104,981
November	......	77,400	....	930,589
December	......	63,600	....	740,873
Totals	1,035,000*	1,118,100	....	$13,086,118

YEARLY TOTALS

	Number	Cost		Number	Cost
1957*....	1,035,000	....	1953.....	1,103,800	$10,488,003
1956.....	1,118,100	$13,086,118	1952.....	1,127,000	10,208,983
1955.....	1,328,900	14,544,647	1951.....	1,091,300	9,800,892
1954.....	1,220,440	12,478,237	1950.....	1,396,000	11,788,595

U. S. Bureau of Labor Statistics.

*Estimated.

FABRICATED STRUCTURAL STEEL

Tons

	Orders Placed 1957	Orders Placed 1956	Orders Placed 1955	Shipments 1957	Shipments 1956	Shipments 1955
January ..	297,629	405,396	241,373	262,177	251,498	225,827
February .	265,894	331,497	233,885	278,453	285,380	213,386
March	289,103	365,517	285,434	305,009	306,760	227,789
April	360,351	378,937	270,226	313,591	289;616	242,337
May	291,750	358,271	303,343	329,626	306,223	222,991
June	220,025	337,236	318,150	329,256	284,719	282,325
July	202,772	288,166	369,414	303,512	165,470	219,444
August ...	167,083	268,273	312,338	333,133	213,495	268,362
September .	194,228	245,617	339,461	294,719	240,858	289,128
October ...	177,178	290,961	308,780	330,950	287,639	283,768
November .	......	338,892	345,308	......	276,045	258,883
December .	......	404,429	367,827	......	297,785	248,017
Totals ..	......	4,013,186	3,695,529	......	3,205,488	2,982,257

	Orders Placed	Shipments
1954	2,509,817	3,135,525
1953	2,786,591	3,117,711

American Institute of Steel Construction.

Industrial Building Cost Index

(1914=100)

	1957	1956	1955	1954	1953	1952
First Quarter	n.a.	405	396	393	383	374
Second Quarter ...	455	421	397	393	385	383
Third Quarter	...	441	399	395	392	383
Fourth Quarter ...	...	n.a.	401	396	392	383

QUARTERLY AVERAGES

1957..	n.a.	1954...	394	1951..	396	1948...	321	1945...	236
1956..	n.a.	1953...	388	1950...	321	1947...	304	1944...	227
1955...	398	1952...	381	1949...	312	1946...	279	1943...	225

Abertháw Co.

n.a.=not available. *Estimated.

Speaking of Records

. . . *our* records show that when a manufacturer once discovers the exceptional and uniform quality of Roebling flat spring steel, he becomes a permanent Roebling customer.

Your records for faster production and lower costs can be improved, in large measure, by Roebling's strict attention to supplying you with the finest flat spring steel available. When you need flat spring steel, specify Roebling. Write Wire and Cold Rolled Steel Products Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

These are typical of the many types of quality parts produced from Roebling flat spring steel.

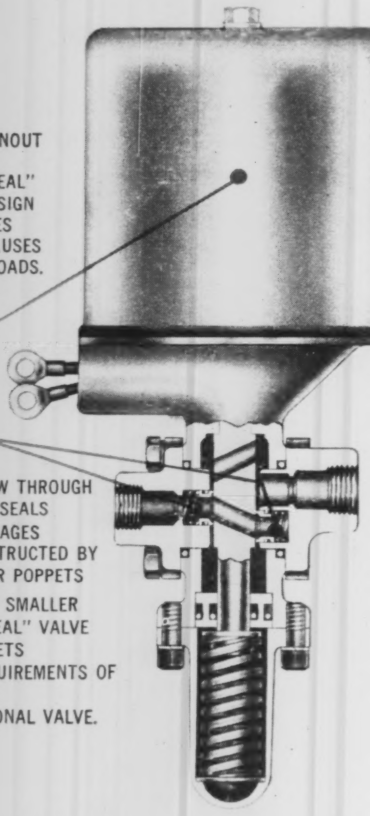
ROEBLING

Branch Offices in Principal Cities • Subsidiary of The Colorado Fuel and Iron Corporation

Roebling... Your Product is Better for it

LEAKPROOF at 3000 P.S.I.

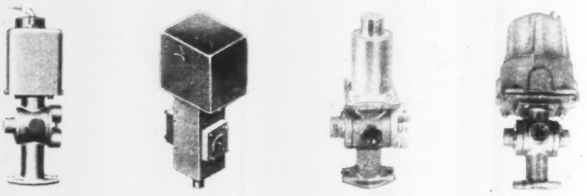
stop creeping cylinders!



NO
COIL BURNOUT
BECAUSE
"SHEAR-SEAL"
VALVE DESIGN
OVERCOMES
MAJOR CAUSES
OF OVERLOADS.

MORE FLOW THROUGH
TUBULAR SEALS
AND PASSAGES
-NOT OBSTRUCTED BY
SPOOLS OR POPPETS
-MEANS A SMALLER
"SHEAR-SEAL" VALVE
OFTEN MEETS
FLOW REQUIREMENTS OF
A LARGER
CONVENTIONAL VALVE.

STANDARD WHEREVER CLOSE LEAKAGE SPECIFICATIONS ARE VITAL: On hydraulic clamps of paper cutters, in propeller pitch control for ships, to lift rollers over seams in textile printing, in rocket charging, in nitrogen and freon charging (refrigeration coils, pressure bottle charging of insecticides and shave cream), as high pressure cut in on presses, on soaking pit doors and lift tables in steel mills, for airblast control on copper converters, on oil well blowout preventers, in test board applications, wherever a valve must be leakproof and stay leakproof.



250 P.S.I., 1000 P.S.I. and 1500 P.S.I. Air Valves; 250 P.S.I., 1500 P.S.I. and 3000 P.S.I. Oil and Water Valves; for A.C. and D.C. operation, Standard and Explosion-proof; Shut-off, Three-way, Four-way and diverter flow patterns.

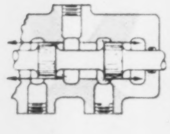
NO STICKING

because the movement of the sealing members does not depend on lubrication, the direct acting solenoid maintains a positive power margin.

LONG, MAINTENANCE-FREE SERVICE

is assured through the lapping action of the Shear-Seals against the slide, which actually improves the sealing qualities of the valve with each operation. The small amount lapped from the Shear-Seals after millions of cycles is compensated by a back-up spring. Dirt or pipe scale cause no damage or failure because the spring keeps the sealing surfaces in constant intimate contact.

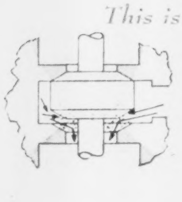
This is why we don't use



SPOOL VALVE DESIGN

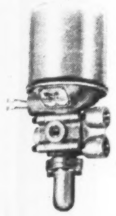
They depend on leakage for lubrication, dirt can enter spool clearance, cause binding and coil burnout.

This is why we don't use



POPPET VALVE DESIGN

Dirt in fluid passes over sealing surfaces, acts like a sand blast quickly destroying sealing qualities.



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19

FORUM ON

TECHNICAL PROGRESS

58

Tomorrow's technological developments are aimed at cutting costs and boosting profits. To help your planning, STEEL has asked 301 authorities to tell you what's ahead in metalworking.

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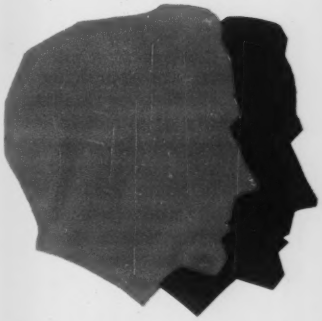


M. W. LIGHTNER
Vice President, Applied Research,
U. S. Steel Corp., Pittsburgh

R. D. HINDSON
Assistant Chief Metallurgist,
Steel Co. of Canada Ltd.,
Hamilton, Ont.

GEORGE E. KOPETZ
Vice President-Production, Blaw-Knox Co., Pittsburgh

WALTER M. PATTERSON
Melting Consultant, Allegheny
Ludlum Steel Corp., Pittsburgh

FORUM ON TECHNICAL PROGRESS

Steelmaking

Steelmakers Study Merits Of Furnace Design Changes

—M. W. LIGHTNER

Much study is being given to furnace and checker chamber design to permit harder firing and to improve heat input rate. The all-basic open hearth, which for many years has been progressing slowly through the developmental stage, has suddenly attracted much wider attention among operators interested in evaluating its potentialities. Furnaces with sloping port roofs and smaller-than-normal uptakes are being tried. The merits of using cold model flow studies and hot model combustion studies to permit development of the optimum furnace design are being recognized.

Steelmakers are appraising the future role of vacuum melting. The relative merits of induction and consumable electrode vacuum melting, compared with conventional melting methods, are being evaluated, especially in the production of aircraft and ultrahigh strength steel grades. The past year has seen the installation of vacuum casting units for the production of large forging ingots. It has been demonstrated that this casting technique materially reduces the hydrogen content of finished forgings. It will be interesting to see the extent to which this method will be developed and eventually used for other steel grades.

Intensified Research Needed Inside Modern Steel Plants

—R. D. HINDSON

We need more applied research inside the steel plant, using existing facilities as a laboratory. Only by bringing highly trained, technical men, well grounded in the fundamentals of chemistry, metallurgy, physics, and mathematics into closer contact with the steel plant operators and problems, can the industry continue to fulfill its trust.

In the past, highly trained technical people with a natural bent for research have not always been given an opportunity to show what they could do. Those to whom research and adherence to scientific principles was essential left to join university staffs or fundamental research institutions. Others joined the large, more popular group of practical metallurgists and engineers, and eventually lost their desire and ability to conduct fundamental research. Those technically trained people who adjusted to the way of industry are now in positions of authority, and, because of their influence the research man is more welcome inside the steel plant.

Let us hope this trend continues and that the day of sticking our best scientists up on a hill and building a wall around them will soon be over.

Day of the Chemist Dawns In Steel Plant Operations

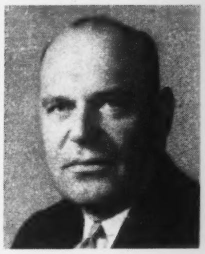
—GEORGE E. KOPETZ

As we turn more and more to chemical technology for improving operations, increasing production, and upgrading byproducts, the line separating metallurgy from chemistry is gradually being erased.

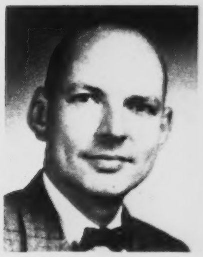
Direct reduction of iron ores will shortly be a commercial reality; ore beneficiation is a proved practice; large scale refining of BTX light oils

FRED O'MARA
Marketing Manager, Electrode Products, National Carbon Co., division of Union Carbide Corp., New York

CLARENCE E. SIMS
Battelle Memorial Institute, Columbus, Ohio



F. O. HESS
President, Selas Corp. of America, Dresher, Pa.



K. C. TAYLOR
Manager, Degassing Systems Div., F. J. Stokes Corp., Philadelphia

is underway; operation of oxygen producing facilities is commonplace; new ore-leaching techniques using solvent extraction and other chemical unit operations are yielding high purity concentrates; steel mill plants are producing fertilizers and other chemicals from what was considered spent coke oven gas; and chemical processing shows high promise of profitably solving waste disposal problems.

Steel Producers Seek Control Of Gases and Tramp Elements

—WALTER M. PATTERSON

Much knowledge has been gained in the control of hydrogen by the proper use of oxygen; and the use of oxygen has increased by leaps and bounds. Purging with dry air, argon, and nitrogen proved to be limited means of eliminating gas, so vacuum treatment holds the current spotlight.

Better scrap preparation and utilization of larger quantities of hot metal in electric furnaces are projects of interest to tonnage operators. Many companies are doing their own scrap preparation, so that heats can be completed with a minimum number of charges.

As more alloy steels are made, the problem of control of residuals and tramp elements becomes more acute. Some tramp elements may impair steel quality and reduce its workability when present in quantities of less than 0.01 per cent.

The spectograph tells us tramp elements are present, but our control ends there. Most of them cannot be eliminated once they are melted, so the best control is to practice segregation of offending alloys.

Arc Furnace Ore Reduction Speeded by Price Squeeze

—F. B. O'MARA

The electric furnace is destined to play an increasingly important role in our steel plants and foundries as the need for additional capacity grows. The heavy capital investment required to make a ton of steel today has all the major steel companies working on new and cheaper methods of producing metallic charge materials for steel furnaces.

One method under study is the direct smelting of iron in submerged arc electric furnaces. The process requires relatively low capital costs, and it has the advantage of being quite flexible with respect to furnace size. Prebaked carbon electrodes are available up to 60 in. in diameter, allowing for a range of furnace sizes to fill the needs of the iron foundry or the large steel mill.

Vacuum Pouring Pays Off In Less Air Contamination

—C. E. SIMS

Commercial specifications considered impossible a few years ago are being demanded and met today. We find that 150-ton ingots are being cast in vacuum merely to remove a few parts per million of hydrogen. The rapidly increasing capacity for melting and casting steels in vacuum is eloquent evidence that such measures are paying off.

As we get a clearer understanding of the factors that influence the quality of steels, perhaps a less drastic and more direct attack on the problems may be employed. Improved refractories and atmospheric control are definitely in the picture. Making steels in air-conditioned furnaces or pouring in air-conditioned rooms may seem fantastic today, but the fantastic of today will be the commonplace of tomorrow.

Compact Annealing Lines Speed Tin Plate Production

—F. O. HESS

By 1959, the production of continuously annealed tin plate is expected to reach 2 million tons, or 36 per cent of total tin plate production (5.6 million tons).

To keep pace with this growing acceptance of the continuously annealed product, a large producer expanded his annual output by more than 400,000 tons. In some nine months of experience with a new, direct gas fired, multiline installation, he achieved an output of 60 tons per hour. He was able to meet the needs of four different customers simultaneously.

Increasing competitive pressures from the aluminum and plastic industries are likely to force the tin plate manufacturer to lighter gage material in greater widths. The compact annealing unit is ideally suited to handle the light gages.

Need for Low Hydrogen Steel Speeds Vacuum Degassing

—K. C. TAYLOR

Refinement of steel in tonnage quantities by vacuum stream degassing has gained quick acceptance as practical and economical. By mid-1958

H. S. SCHAUFUS
Chief Metallurgical Engineer,
Vanadium Corp. of America,
Cambridge, Ohio

BRUCE S. OLD
Arthur D. Little Inc.,
Cambridge, Mass.

PHILIP J. BERG
Manager, Engineering & Construction
Sales, Machinery Div., Dravo Corp.,
Pittsburgh

MERRILL COX
Vice President, Metals Div.
Arthur G. McKee & Co.,
Cleveland

we can expect to see production equipment in operation in this country with a monthly pouring capacity in excess of 10,000 tons.

The process adds only a moderate amount to conventional steelmaking costs. The premium is partly recoverable in the form of increased yield of usable metal which is gas-free and more ductile. Comparative premium costs for vacuum refining of steel by the three methods now in use (excluding development expenses) are: Induction melting, 40 cents a pound; consumable-electrode melting, 20 cents; stream degassing, 1 cent.

Heats of alloy steel as large as 250 tons have been successfully degassed by the vacuum stream method. This is more than 100 times the capacity of the largest vacuum-induction melting furnace. Hydrogen content is reduced (below 1.5 ppm), ductility is increased, and oxide inclusions are markedly reduced.

Ferroalloys Are Tailored To Fit Steelmakers' Needs

—H. S. SCHAUFUS

Expansion of facilities for the production of ferro and master alloys during 1957 kept pace with added capacity in the iron, steel, and specialized metals industries.

Ferrochromium products continue to take a prominent position in establishing the most desirable grades for stainless, heat resistant, tool steels, and specialized high temperature alloys. Alloys and combinations of silicon, manganese, titanium, vanadium, columbium, molybdenum, tungsten, and boron have improved in purity and physical stability. Steelmakers' increased interest in new compositions and forms of ferroalloys will result in greater economy in steelmaking.

New methods of packaging permit easy handling with minimum mechanical loss. Expanding vacuum melting operations are not being overlooked, and specially refined ferroalloys and metals are being developed for their needs.

Urges Careful Study Of Direct Reduction

—BRUCE S. OLD

Current interest in direct reduction in the U. S. has come about because of rising capital investment costs in steelmaking, increasingly fine ores which adversely affect blast furnace operation, increased use of lower grade ores which require the development of economic enrichment methods, uncertain scrap costs, and the development of new direct reduction methods which literally force a new look at an old art.

A great many technical articles are being written on the processes. Everyone is pushing for operating details. We must exercise some patience. There is a tendency by some to oversell, and there is another school which points out many reasons why direct reduction will never compete with the blast furnace.

At this time it is probably best to take a constructive middle course and to evaluate the processes and their many possible applications as more accurate cost data are evolved. It looks to me as though the chances of application of direct reduction are sufficiently promising to warrant continued careful attention by the steel industry.

Conditions Favor Growth Of Sintering Facilities

—P. J. BERG

Basic economics—more production for less money with existing materials and blast furnaces—point to a continued expansion of sinter plant facilities in 1958. Major factors responsible are: 1. Depleted reserves of high grade domestic ores and the importation of lower grade materials. 2. Decided increase in pig iron production, with a reduction in coke and limestone requirements when sinter is used. 3. Rapidly growing steel capacity which has placed demand for more pig iron on blast furnaces costing millions of dollars to build.

By the end of 1958, sintering capacity in the U. S. will have increased some 50 per cent over that of 1957—to about 60 million tons. Output in 1957 was about 40 million tons.

In 1958, Dravo Corp. will complete four sintering plant projects. Two of them will have output capacity of 15,000 tons per day each.

Watch Six Steelmaking Areas For Technical Advances in '58

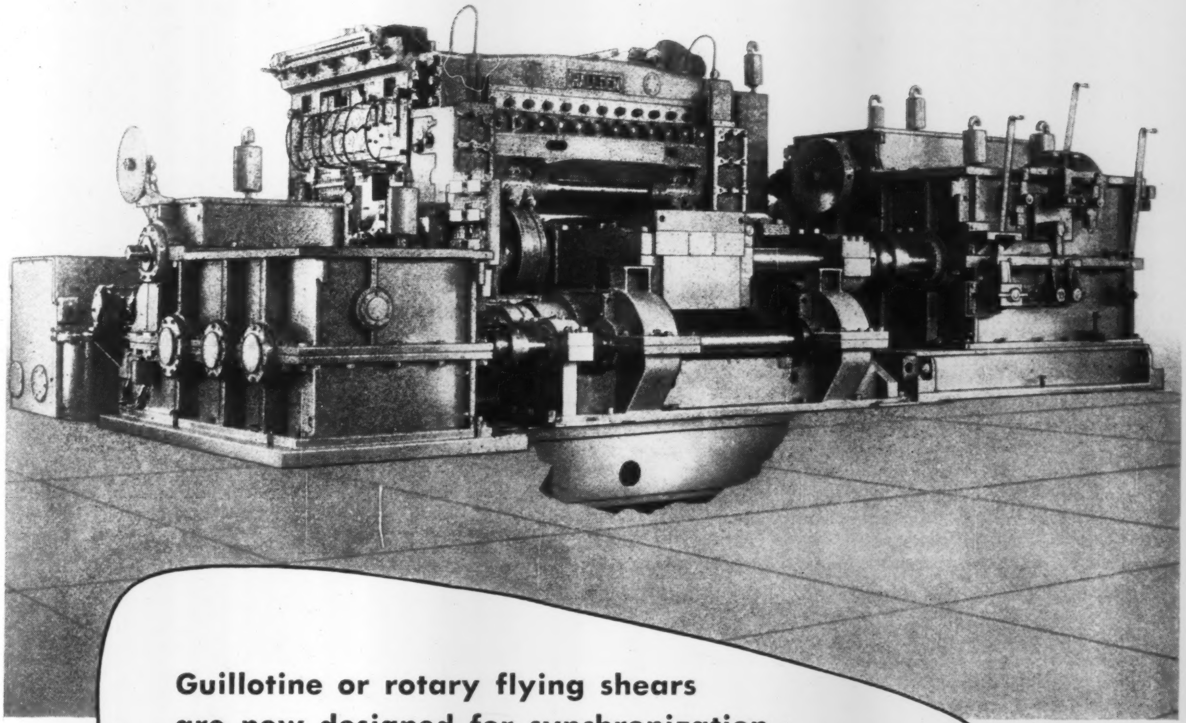
—MERRILL COX

As we see it, the technical changes most likely to take place in the steel industry in 1958 include:

1. Advances in the use of sinter and prepared raw materials for the production of pig iron. Progress thus far indicates marked increases in blast furnace tonnages and decrease in coke rate.

2. Start of operations for many large new sintering plants. Plans are in the making for a number of iron

SYNCHRONIZED *"On the Fly"*



Guillotine or rotary flying shears are now designed for synchronization adjustment without stopping the machine.

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HAROLD ROWEN
General Manager, Dwight-Lloyd Div., McDowell Co. Inc., Cleveland

JOHN K. STEWART
Manager, Steel Mill Sales Div., Air Products Inc., Allentown, Pa.

D. E. MOAT
Director of Marketing Dept., Leeds & Northrup Co., Philadelphia

JOHN P. HOLT
Assistant Vice President, Basic Inc., Cleveland

ore concentrating plants using pelletizing processes. However, the various methods of pelletizing are subject to further refinement and at least one completely new process is under development.

3. Continuation of interest in gaseous or direct reduction of iron ore. Developments in this field probably will result in the construction of at least one fairly large scale pilot plant during the year.

4. Further utilization of oxygen steelmaking processes, such as the Kaldo, German Rotor, and Lintz-Donawitz processes. This will be achieved by expansion and extension of existing plants and the beginning of operations of at least one new L-D plant.

5. Introduction of oxygen through the roof of the conventional openhearth furnace. This refinement of an existing process and equipment can accomplish greatly increased production with a relatively small outlay of capital. It is probable that plant modifications and new plants for further utilization of this means of oxygen steelmaking will be built in 1958.

6. Automation of new rolling mills. This trend will undoubtedly continue, not only in the rolling of steel but wherever possible in the iron and steelmaking departments of the mills.

Sintering Here To Stay, New Developments Prove

—HAROLD E. ROWEN

Present expansion of sintering more than equals the operating installed capacities of the preceding 50 years. More is to come as the proper use of sinter is developed and the economic results become a matter of record.

Accomplishments of the sintering machine include: Pellet induration by up and downdraft; premium grades of iron sinter from pyritic ores assaying 50 per cent or more sulfur; highly reduced products with exceptionally high metallic content; and nonmagnetic ores prepared for magnetic concentration.

Sintering is here to stay and grow in the U. S., Canada, and other parts of the world. Many overseas producers must depend on sintering efficiencies as ore grades and sizing decrease and the costs of additional blast furnaces increase.

Oxygen Processes Add Impetus To Steel Consuming Economy

—JOHN K. STEWART

Despite current temporary softness in the market, the long term, per capita consumption of steel products should continue to rise, due to our rising standard of living and the new uses that are being found for steel. Most of these new uses and the new alloys that have made them possible have been a direct result of the aggressive development programs being conducted by steel producers.

Steelmaking technology is making great strides in providing the customer with a superior product at a lower cost. Due in large part to the lower cost of oxygen from on-site generators, some of which have been operating since 1945, the steel industry can finally adopt many steelmaking processes which were economically impractical when oxygen was a hauled-in, high priced chemical.

Top-blown oxygen converters, openhearth roof jets, combustion oxygen and blast furnace air enrichment are just a few of the oxygen consuming processes which will be used increasingly.

New Oxygen Analyzer Ups Open Hearth Efficiency

—D. E. MOAT

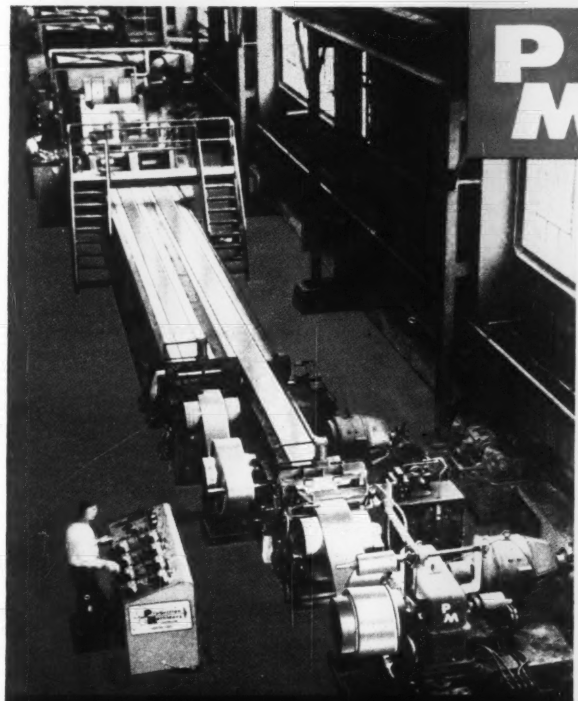
Combustion efficiency is a primary concern in steelmaking, and the problem of analyzing waste gases in open hearth combustion has received much study by steel people. We have developed a new sampling and measuring system for oxygen analysis that operates continuously under the adverse conditions of an open hearth shop.

It works on the principle that oxygen is usually paramagnetic. It makes no difference what type fuel or combination of fuels is used, the measurement will accurately reflect furnace oxygen content. Exterior influences on the sample—temperature, pressure, humidity, are canceled out by the circuitry. This feature, along with the fact that the analyzer can be checked and calibrated with surrounding air, makes it an outstanding tool for more efficient open hearth operation.

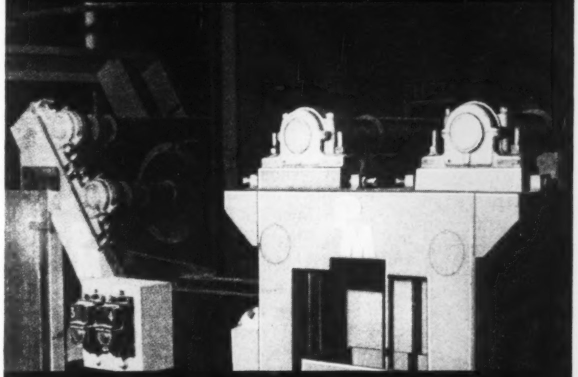
Tar-Bonded Refractories Give Good L-D Performance

—J. P. HOLT

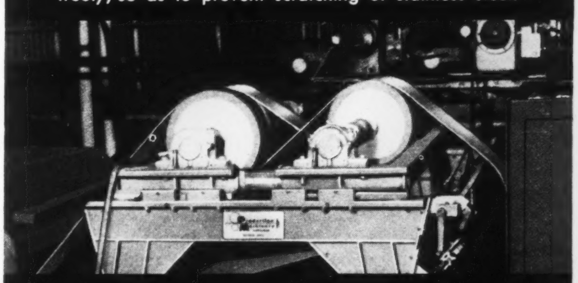
European steelmakers have long used tar-bonded basic brick and ramming mixes for applications where Ameri-



Finish end of new PM 2-strand pickle line that improves output, quality for stainless steel producer. (Note evenness of coils on PM coilers.)



Separate, independent rolls for each strand have shafts mounted in anti-friction bearings outside pickle tanks away from corrosive fumes. This permits rolls to turn freely, so as to prevent scratching of stainless steel.



Greater wrap of stainless steel around idler support rolls, and special surface of roll covers, also insure free turning, non-scratching rolls to handle wet, slippery steel.

PM's "PRODUCTIONEERING"

Key to
- more output . . .
- better quality . . .
- improved operation

from this new pickle line

As an example of what "productioneering" by PM can do for you, take one feature of a new PM pickle line recently installed for a major steel producer:

Previously, support rolls on continuous pickling lines processing stainless steel tended to mar the surface of the metal. Marks were produced when the idler rolls failed to turn as fast as the strip passing over them.

Because PM designers *understood* this problem, they were able to design the new pickle line with special bearings, provision for a greater degree of wrap of the steel around the rolls, special type of surface on the rubber covering, and other design details which insure the rolls turning at strip speed, so as to eliminate scratching of the stainless steel.

This and additional design refinements such as automatic strip tracking devices make this line capable of more usable output, with greater uniformity in product quality, and less trouble for operators.

Productioneering can solve tough production equipment problems for *you*, too. *Productioneering* is the PM way of working so engineers who supervise designing have first-hand knowledge of problems encountered by machinery owners. In working with PM, you work with responsible experienced engineers who apply their skill to solve your problems. PM's equipment recommendations suit your specific needs — that's why it pays to *call in a PM man* as soon as you start planning installation of any of the metal processing equipment listed below.

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Continuous strip pickling lines
Stainless steel processing equipment
Slitting lines
Shearing and cut-to length lines
Vacuum and magnetic sheet feeders and pilers
Uncoilers, shears, pinch rolls, reels, and other special equipment

R. P. HEUER
Vice President, General Refractories Co., Philadelphia

RUFUS EASTON
Manager, Continuous Casting Section, Freyn Dept., Koppers Co. Inc., Pittsburgh

G. E. DRAKE
Vice President, Electro Metallurgical Co., division of Union Carbide Corp., New York

can practice calls for burned or chemically bonded basic brick. In America, tar-bonded basic refractories are used to line oxygen steelmaking vessels. In this application, they outperform other refractories. Now that we have oxygen steelmaking in this country, we need local sources of supply. We are producing these refractories.

At present, the most popular tar-bonded basic refractories in this country are made from dead-burned dolomite, magnesite, and certain grades of coal tar pitch. One reason for the good refractory properties of these products is that they contain no added silicate binders. They have excellent spall resistance under the conditions existing during the rapid heating of a newly installed oxygen vessel lining. Dead-burned dolomite is an inexpensive basic refractory. Tar-bonded brick and ramming mixes containing substantial amounts of dead-burned dolomite can be produced at reasonable cost.

Brick With Internal Plates Used More, Last Longer

—R. P. HEUER

Chemically bonded brick having internally molded steel plates continue to find wider use for basic open-hearth roof and wall construction because of their greater resistance to spalling. Latest improvement: Internal plates extending through the full length of the brick.

When used in suspended construction, these brick can be made without the hanger recess that was formerly molded in the refractory 2 to 3 in. from the mold face. This is done by incorporating a stainless steel tab or special clip positioned at the extreme end of the brick. It is the connecting link between the brick and support apparatus. Elimination of the hanger recess avoids use of expensive castings as hangers and provides more usable brick with proportionately longer life.

The leading refractory makers are spending several millions of dollars on facilities for more extensive research, development, and quality control. The most progressive programs call for research and development facilities separate from those for quality control to better utilize personnel.

Continuous Casting Outlook Excellent at Today's Costs

—RUFUS EASTON

While several continuous casting machines under construction in Europe are of the general purpose type, it appears that the trend will be toward specialized machines. They will be either relatively short and light four-strand machines for casting billets up to about 10 in. square in heat sizes to about 75 tons, or slab casting machines of high and heavy construction, capable of handling up to about 150-ton heats in two strands. Most of the necessary height will be obtained by using a pit deep enough to bring the machine under conventional pouring crane level.

Commercial operation of continuous casting machines in the carbon steel field is well established in Europe and Japan. Several machines of American design are being used. The Russian trend is toward slab machines, with new installations in open hearth shops of gradually increasing heat size.

Consider an integrated plant using direct reduction, electric or oxygen steelmaking, continuous casting, and relatively small finishing mills. While it probably could not compete economically with a conventional plant built 20 years ago, it might with a conventional one built at today's prices. The new production methods may be built and operated at attractive costs in much smaller productive units. The minimum economical size of an integrated plant may be lowered into the range of 50,000 to 100,000 tons per year.

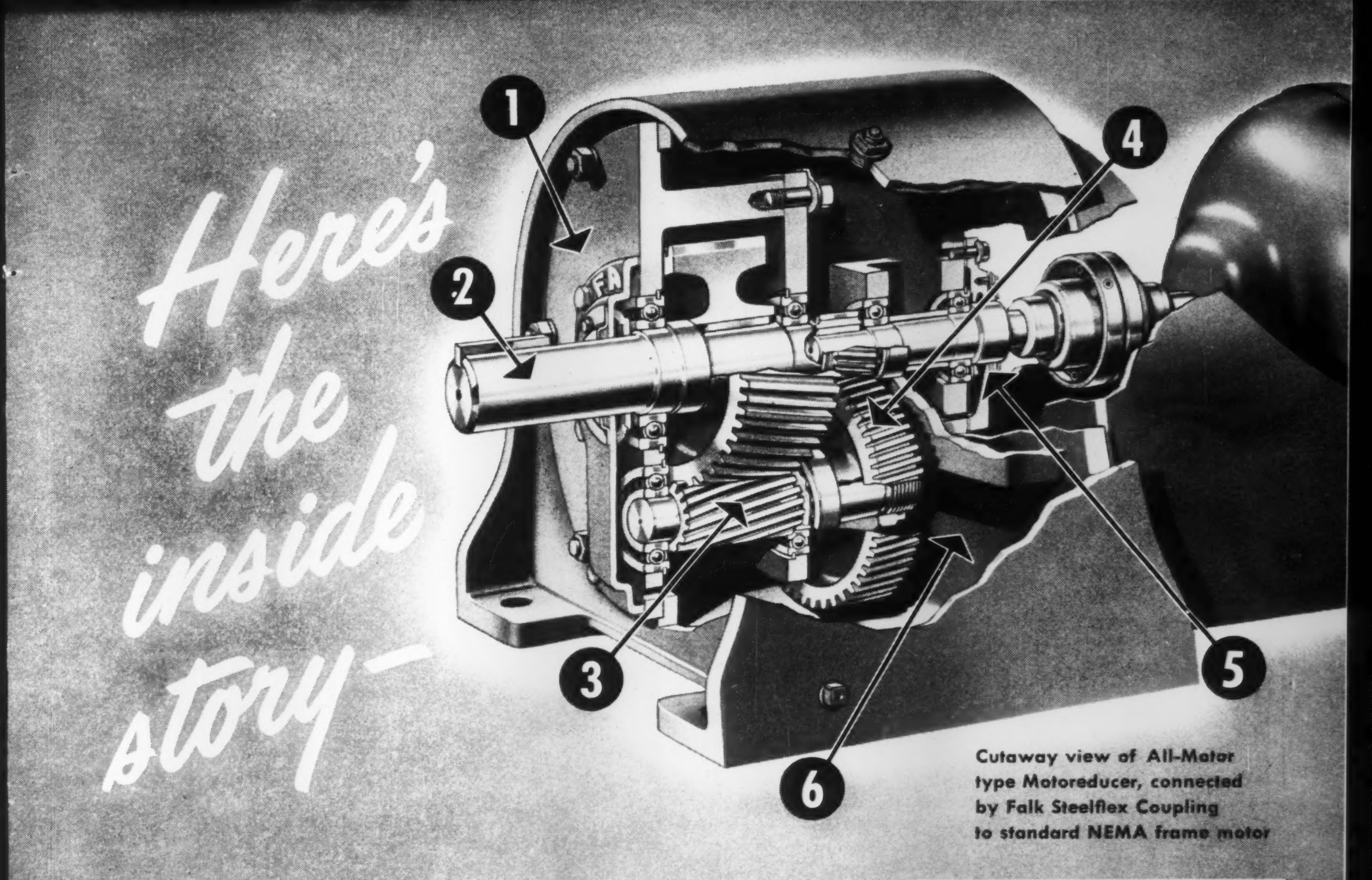
Ferroalloy Production Dips But 1958 Picture Looks Good

—G. E. DRAKE

The reduced output of the steel industry during 1957, and especially the decline in stainless and other high alloy steel melting, resulted in a decrease in ferroalloy use last year. Not much change from 1957's total steel output is anticipated for 1958. However, operating rates in the second half of 1958 should be higher than those in the first half.

Growing acceptance of the 200 series, the chrome-nickel-manganese stainless steels, was seen in the 1957 production of about 25,000 ingot tons, compared with 20,000 tons produced in 1956. Not only did this increase run counter to the general downward trend for stainless steels, but it took place during the period when more nickel became available than ever before. Production of heat-resisting stainless steels and high-temperature alloys should increase in 1958 because of the accelerated demand for these materials in gas turbines, missiles, supersonic aircraft, and atomic reactors.

In the new product line, self-reducing vanadium was introduced for tool steel production. Self-reducing tungsten found increasing acceptance. There was increased use of exothermic ferroalloys that permit larger additions to the ladle as well as closer control of final analysis. This year will see the introduction of new or improved alloy steels, and



Cutaway view of All-Motor type Motoreducer, connected by Falk Steelflex Coupling to standard NEMA frame motor

WHY Falk Motoreducers give better service—have longer life

Here is the "inside story" behind the all-steel All-Motor type FALK Motoreducer's universal reputation as a gear drive unmatched in quality, efficiency, dependability, ease of maintenance and long life. These "In-built" factors are—

1 **ALL-STEEL HOUSINGS.** Rugged, strong, rigid... all parts are manufactured from heavy steel plate, formed and welded in the Falk Weld Shop.

2 **LARGE OVERHUNG LOAD CAPACITY.** Large shafts, oversize bearings... rigid mountings with wide bearing spans to handle maximum applied loads.

3 **PRECISION GEARING.** Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion. Quiet, crown-shaved pinions.

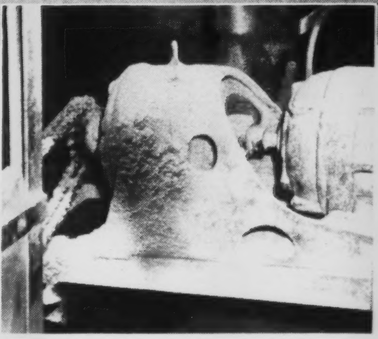
4 **EXTRA-CAPACITY GEARING.** Special extra-capacity gear-tooth form with larger contact area gives greater strength, higher load-carrying capacity.

5 **SEALED HOUSINGS.** Splashproof, dustproof, oil-tight construction. Dual closures and one-way vents keep oil in, dust and moisture out.

6 **POSITIVE LUBRICATION.** Large sump capacity... oiltight construction assures clean lubricant... revolving elements lubricated by direct dip.

When you buy or specify the All-Motor type FALK Motoreducer, you get all these—plus the tremendous advantage of full interchangeability of motors. Switch motors as desired—use any make, style or type of standard foot-mounted motor within the unit's AGMA rating—with a minimum of difficulty or "down time."

Available in sizes up to 75 hp—*with or without motor*—from convenient factory, field or distributor stocks, from coast to coast. **Write for Bulletin 3100.**



60,000 HOURS WITHOUT A FAILURE!

Sixty thousand hours is a lot of hours—but the FALK Motoreducer in the unretouched photo above has served that long without failure or need of repair.

This 3 hp unit is one of over 60 FALK Motoreducers in daily service in an Eastern plant of a large milling company, whose president says, in part:

"One of the main advantages of FALK Motoreducers is their adaptability to any motor. Reducers and motors can be easily interchanged.... Our service records confirm the wisdom of our choice of FALK equipment as our standard."

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- Flexible Couplings
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- Special Gear Drives
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- Weldments
- Contract Machining

Hy Peskin photo taken at Ice Follies.

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T. F. OLT
Director of Research, Armco Steel Corp., Middletown, Ohio

there will be a definite trend toward special ferroalloy compositions for their production.

Interest in Direct Reduction Boosted by Cheap Natural Gas

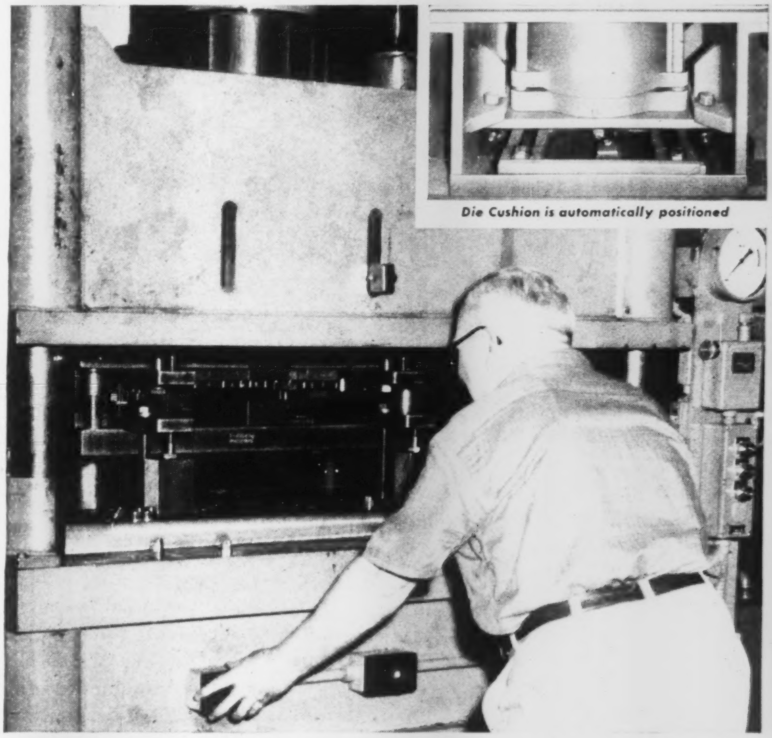
—T. F. OLT

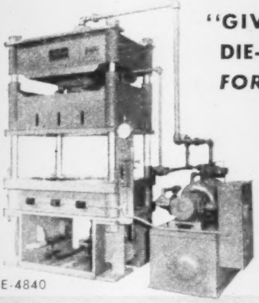
The rising investment cost for coke ovens and blast furnaces to smelt pig iron, the discovery of some extremely rich natural ores, and improved procedures for beneficiating lower grade iron ores have resulted in increased interest in the manufacture of sponge iron. Gradual deterioration in quality of metallurgical coking coal is further stimulating interest, particularly in areas where natural gas is plentiful and economically advantageous.

There are numerous experimental installations for making sponge iron, and others are contemplated. It is claimed that the processes require considerably less capital investment per ton of output than the coke blast furnace and its accessories. The reducing gas can be produced by steam-methane reforming techniques or by partial oxidation of methane or other hydrocarbons with oxygen or air. Maximum reducing gas utilization is generally secured by partial recirculation of the reducing gases after removal of water and carbon dioxide.

It would appear that the advantageous utilization of sponge iron for melting in open hearths, electric furnaces, or cupolas will require development of economic means for compacting the sponge. It is also desirable to use an ore having extremely low gangue content in its natural or beneficiated state, or else an ore

(*Please turn to Page 222*)





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Model No. 100SE-4840

SPECIFICATIONS:

DIE CUSHION Capacity—tons	22.6
DAYLIGHT — in/max.	24
RAM STROKE — in	18
RAM SPEEDS — in/min.:	
Approach	160
Pressing	29
Return	250

CONTROLS — Electric Push Button
20 H.P. UNIT

The new K. R. Wilson Four-Column, Down Acting Press recently delivered to Stewart-Warner Corp. does "double duty" in their Chicago plant. The 100 ton capacity press features an automatically-positioned pneumatic die cushion. With the cushion in position, the press can be used both for die-tryout and for production runs utilizing forming or drawing dies. When the cushion is retracted, spring loaded dies can be used. With the air evacuated from the cushion, the press can be used for blanking. With such operational flexibility, and rapid conversion features, the K. R. Wilson Model No. 100SE-4840 Press can be kept in nearly continuous operation. Get all the facts now on this time-saving, money-making press.

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DU PONT

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PRODUCT NEWS

Don't judge the cost of a cleaning process by solvent or chemical costs alone

Du Pont's new Cost Analysis Service can help you determine total costs . . . the only realistic basis of comparison

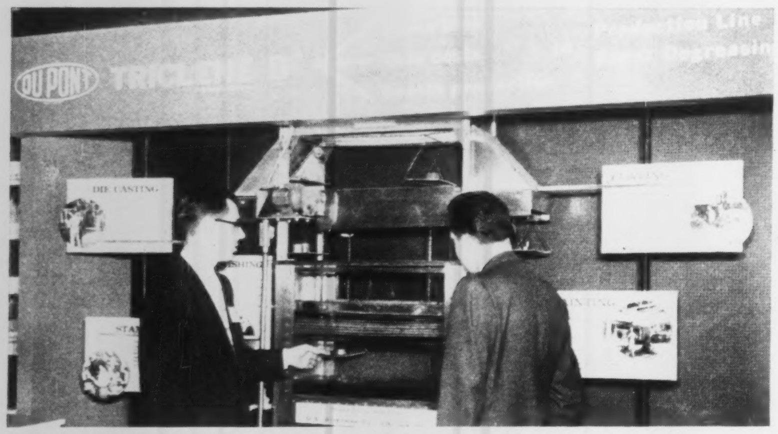
It's easy to draw misleading conclusions about the comparative costs of vapor degreasing and wet cleaning by comparing only the cost of trichlorethylene versus alkali chemicals. Such conclusions can result in a costly mistake when choosing a metal-cleaning process. *Invoices tell only part of the story!*

Du Pont has initiated this new cost-analysis service to help you find out what your metal cleaning is now costing, or, in the case of expansion or new installations, to help you determine the most efficient and economical process. Based upon sound accounting principles and 25 years of Du Pont "know-how" in metal cleaning, this service reveals the *total* cost of your operation. All cost factors are considered, including utilities, maintenance and depreciation, labor and the important item of "return on investment."

This Du Pont service can save you real money—in your present operation, or in the consideration of new or replacement equipment. Example: in a plant operating 7 degreasers, over-all cleaning costs appeared out of line. Changes adopted as the result of a Du Pont survey paid off in savings of $3,000 to $6,000 per degreaser.

GET ALL THE FACTS about this informative, cost-saving service. Just ask your local distributor of Triclene® D trichlorethylene, or send us the coupon at right, below.

* * *



DU PONT TECHNICAL MAN points out for visitor how thoroughly grease is removed from metal part suspended in model degreaser. Glass sides of degreaser enabled visitors to see entire process.

Du Pont booth at Metal Show featured Model Degreaser

Visitors to the recent Metal Show in Chicago saw "Triclene" D trichlorethylene in action. They learned how quickly and thoroughly the vapor-degreasing process works and heard about Du Pont's new cost analysis. If you missed the show and are interested in learning more about vapor degreasing and/or Du Pont's Cost Analysis Service, just send us the coupon at right.

How's your supply of "Tri"?

Check your supply of trichlorethylene and be sure you won't be caught short during peak work loads. If you're low, better give your local distributor of "Triclene" D a call. He's well equipped to handle your orders promptly and efficiently.

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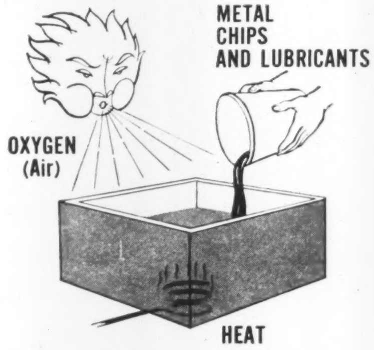


Completely stabilized against breakdown

TRICLENE® D
Trichlorethylene

assures fewer degreaser cleanouts

You can count on brighter, cleaner work and easier, less frequent degreaser cleanouts when you use "Triclene" D.

"Triclene" D contains special stabilizers to protect the solvent against the major deteriorating influences present in modern metal-cleaning operations . . . fatty acids, sulfur-bearing lubricants, oxygen, heat and metal chlorides. These stabilizers, in turn, are backed by a neutral acid acceptor. All of these stabilizers are designed to remain in the solvent indefinitely through distillation after distillation.

The stabilizers in Du Pont "Triclene" D do not combine with fatty acids and other contaminants to form sludge. This is your assurance that your degreaser will maintain peak operating efficiency with fewer, easier cleanouts.

Try Du Pont "Triclene" D and find out for yourself how "full-time" stabilizers make the difference!

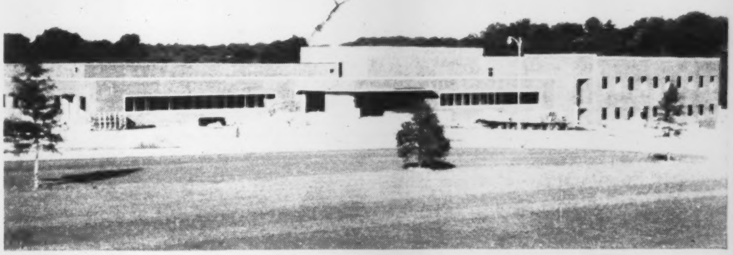
New $2 million Du Pont Laboratory will help solve your metal-cleaning problems

In April 1958, the facilities of Du Pont's new Sales Technical Laboratory will provide extra support for the services now offered by your local distributor of "Triclene" D and your Du Pont Technical Representative.

This modern laboratory will have the latest conveyorized production-line vapor-degreasing equipment, including an ultrasonic unit . . . all equipment needed to research problems encountered in both large and small units, hand-operated or mechanized.

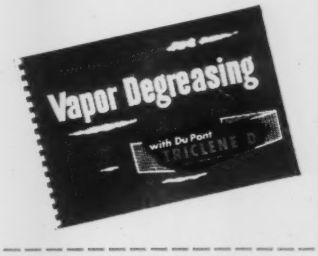
Accurate metering devices will make it possible to pinpoint utility costs and to determine solvent losses for all types of production operations. Customers' actual plant conditions can be duplicated and evaluated against norms established at this new laboratory. Actual and theoretical operating costs can be compared.

Ask your Du Pont Technical Representative for further details about this new laboratory—the finest of its kind—soon to be ready to help *you!*



NEW LABORATORY contains 25,000 sq. ft. of floor space and will contain full-scale equipment for demonstration and customer service.

FREE VAPOR-DEGREASING BOOKLET tells you how vapor degreasing works, shows types of equipment, points out many cost-saving advantages. Just mail the coupon below for your copy.



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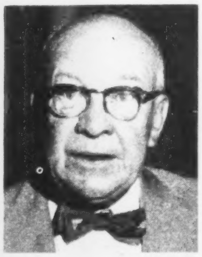
☐ Please send me your booklet on vapor degreasing.
☐ Please have your representative call for an appointment.

*Name*__________ *Position*__________
*Present method of cleaning*__________
*Firm*__________
*Address*__________
*City*__________ *Zone*_____ *State*__________



J. W. DOUGHERTY
Vice President, Heyl & Patterson Inc., Pittsburgh

in which the gangue is readily released during reduction. Such a sponge can be beneficiated easily by magnetic concentration after reduction to minimize yield losses of iron in the slag generated from the gangue during melting.

Continuity in Ore Handling Provided by Conveyors

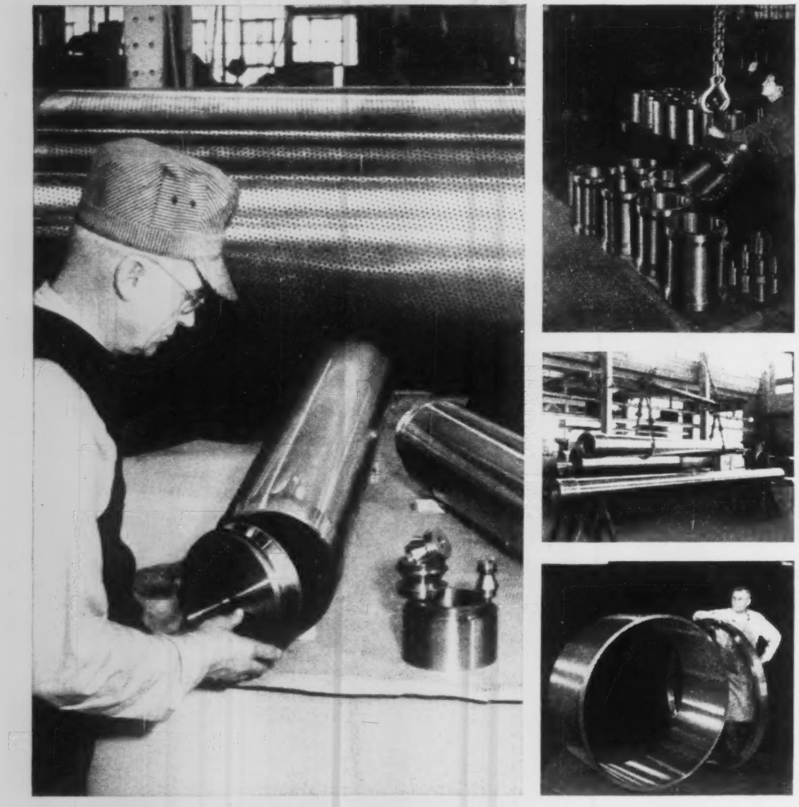
—J. W. DOUGHERTY

There are cases where the use of ore bridges for boat unloading, stockpiling, and reclaiming is more economical than a combination of unloaders and ore bridges. (Investment, maintenance, and operating costs are less.) Many such plants have been built recently.

But in cases where large tonnages are to be handled, ship turnaround time is critical, or ore is to be specially prepared or stockpiled in auxiliary yards, then unloaders designed for fast cycles from ship holds to hoppers are an economic necessity.

The systems are intermittent or batch type. Continuity of travel of the material is interrupted between the separate units.

New ideas and equipment are being used to increase the continuous flow of materials from ships or railroad cars to the blast furnace bins. Ore can be unloaded from ships by bridges, or unloaders, or dumped from railroad cars by rotary car dumpers into surge bins which feed conveyor systems. They deliver by stacker to an initial pile or to the furnace bins. Modern dispatching and electronic control with this type system should enable one operator



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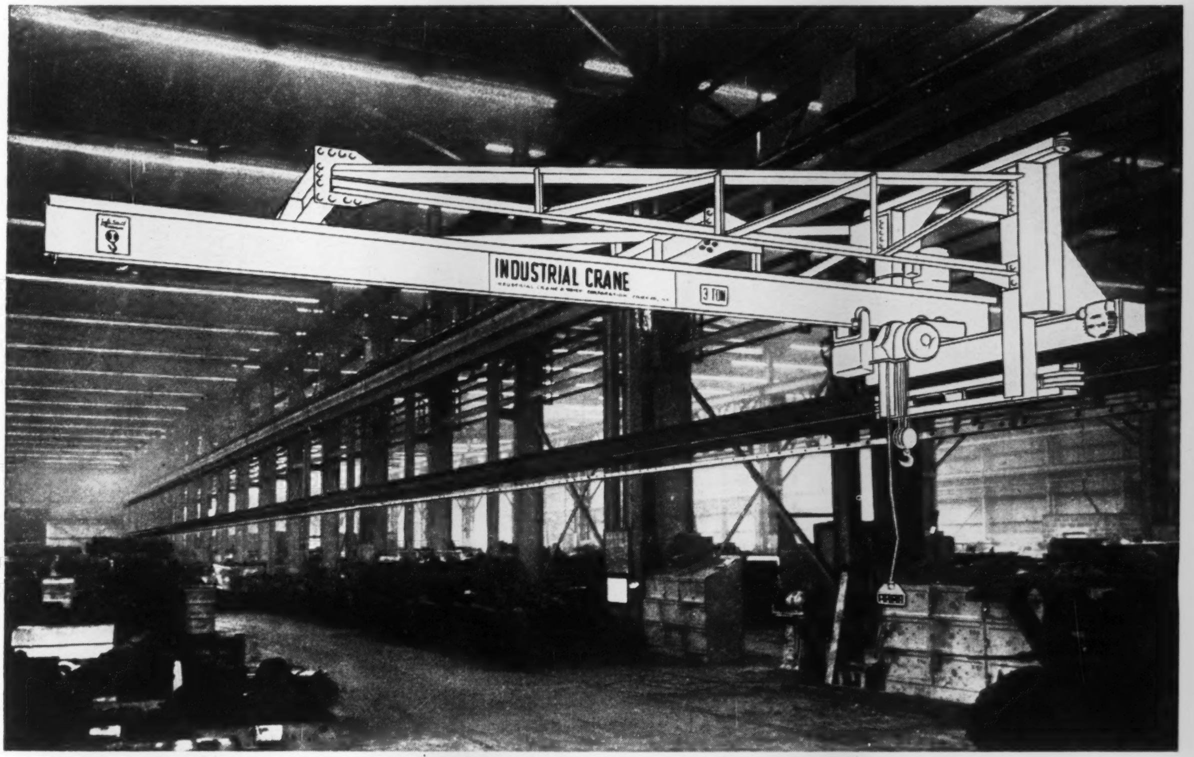
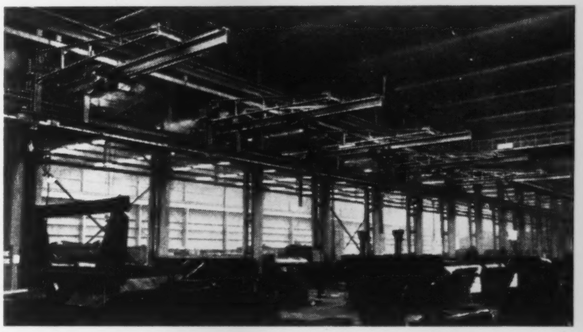
14 Industrial Cranes chosen by largest railroad car shop



wall traveling jib crane features maximum hook coverage

This mammoth railroad car shop installed 14 *Industrial* wall traveling jib cranes to obtain maximum flexibility of operation without obstruction of floor space or interference of overhead cranes. Operating singly or in multiples these *Industrial* cranes easily move along the long runway with assembly line load and in effect give infinite number of jib crane installations depending on requirements.

Consult with Industrial Crane & Hoist for practical answers to your materials handling problems.



3-ton capacity with 30 ft. span Wall Traveling Jib Cranes with Hi-carbon steel boom. Cranes operate on six double flange 12" forged steel wheels rolling on two horizontal and one vertical runway.

Industrial CRANES

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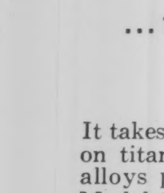

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L. F. REINARTZ
Consultant, Armco Steel Corp.,
Middletown, Ohio

to deliver any kind of ore or other material to a designated location in the oreyard.

Opportunity Knocks for Mills To Apply Plant Improvements

—L. F. REINARTZ

Progressive steel plant managers have taken the opportunity, because of reduced operations in open-hearth shops, to improve plant operations. Better scrap handling, increased size of charging pans, lengthened and widened hearths of older furnaces, wider door openings, and increased height of roofs have helped increase open-hearth production 10 to 30 per cent.

In some plants, furnace capacities have been increased beyond ladle crane and runway capacities. In such cases, the use of all-welded ladles, lightweight, modern ladle crane trolleys, and bifurcated spouts has increased production of such enlarged furnaces 20 to 75 per cent.

Many plants are experimenting with all-basic furnaces. This trend will continue. High, suspended basic roofs should help increase furnace roof life.

Much attention has been given to increased flame velocities and high Btu per hour fuel input, especially during charging and melting periods. Oxygen is being used to a greater extent for improved combustion through end burners and roof lances.

As large oxygen plants are built in or near steel plants, cost of tonnage oxygen will decrease and the use of this commodity will increase by leaps and bounds. In coming years, this should result in great in-

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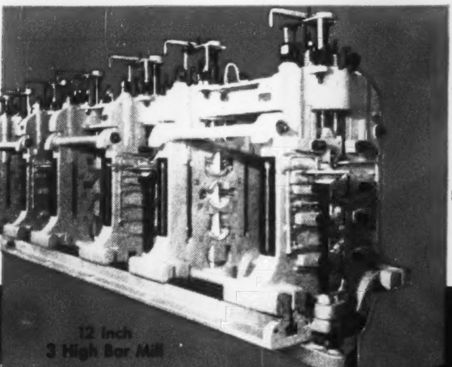
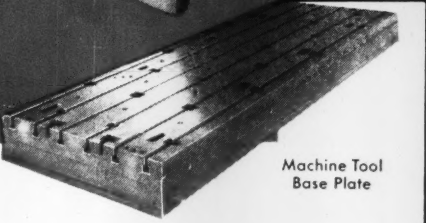
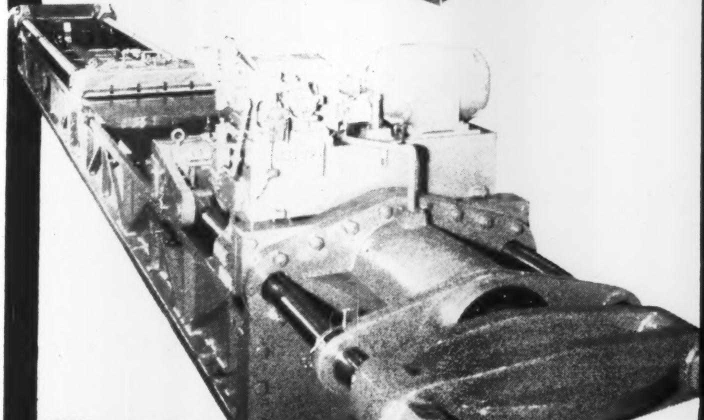

12 Inch
3 High Bar Mill


Machine Tool
Base Plate


66"x 385" Sheet
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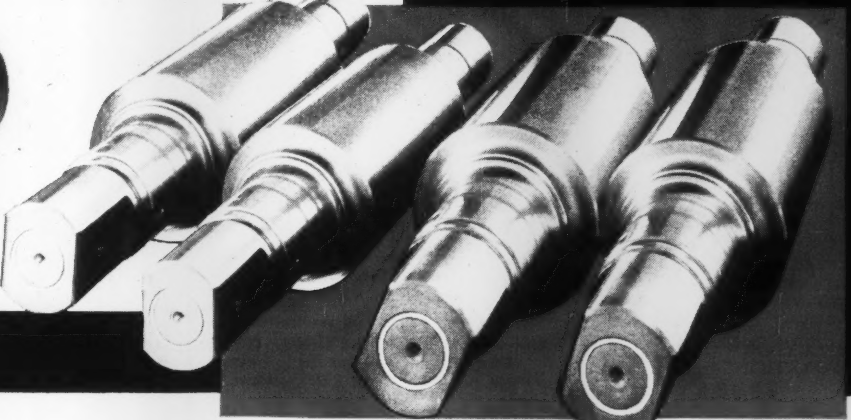

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HARRY W. McQUAID
Consultant, Cleveland

creases in production from existing furnaces.

L-D oxygen steel melting converters in three more steel plants in the U. S. will start operation in 1958. Because of claimed low capital and operating costs, this trend is apt to continue in plants having excess hot metal.

Synthetic Scrap, Ductile Iron Are Areas To Watch in '58

—HARRY W. McQUAID

There is wide interest in the direct reduction of iron ore which will help stabilize the cost of scrap by supplying a satisfactory competitor. Worth watching in 1958 is the direct reduction of iron ore with carbon to produce high carbon briquets of relatively low sulfur, low silicon content which should compare as a melting charge with cold pig.

Where hot metal is available, the oxygen over-blown bessemer promises to replace the open hearth entirely for high tonnage production because of its quality and improved economy. This is tied in with fixed charges, especially in a new plant.

New in 1958 will be a greatly improved method of desulfurizing and desiliconizing which promises to stir up the merchant iron and foundry iron field and especially the nodular or ductile iron producer. This method of producing a practically sulfur-free ductile iron, regardless of cupola coke or charge quality, promises to improve nodular iron to the point where it will enter a field now supplied by steel.

This same process for high production of hot metal treated to re-

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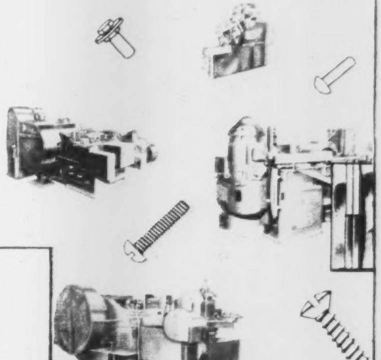
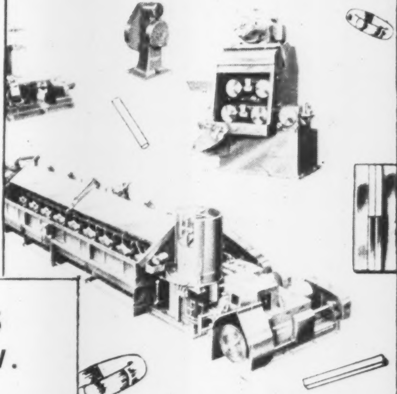


Machinery for mass production of standard and special bolts, nuts, rivets, screws and other cold formed parts.

WIRE MILL EQUIPMENT DIV.



Machinery for the economical drawing of non-ferrous wire in heavy, intermediate and fine wire sizes.

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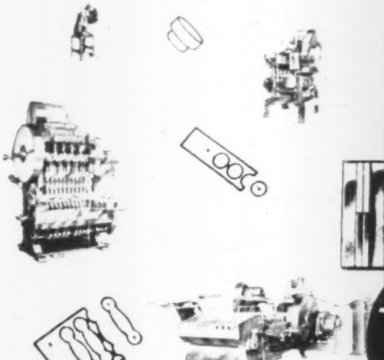
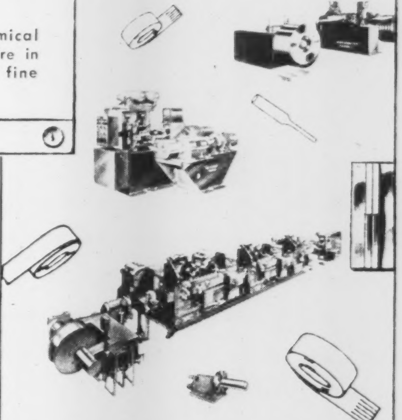


Machinery for quantity production of parts requiring blanking, stamping, forming, deep drawing, threading, trimming, beading or other operations.

ROLLING MILL EQUIPMENT DIV.



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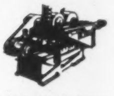
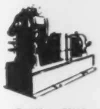
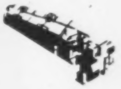


Bolt, Nut & Screw Machinery

Power Presses



Rolling Mill Machinery



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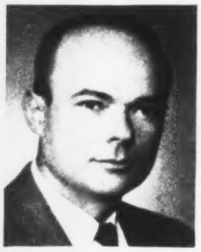

W. E. MILLER
Manager, Steel Mill Engineering, Systems Application Engineering Section, General Electric Co., Schenectady, N. Y.

move sulfur, phosphorus, silicon, and carbon will be used in 1958 to rapidly make high quality steel, and also as a means of treating molten iron ore with carbon to remove oxygen and provide the liquid hot metal needed for either modern open hearths or bessemers.

Successful Mill Automation Requires Long Range Planning

—W. E. MILLER

Automation is a process of evolution. To be successful on a basis as broad as a steel plant, it needs a basic plan. Elements common to all processes need to be compatible. On the long term basis, there will be a combining of processes with increasing complexity of drive and control systems.

One approach to the automation of steel plant processes is to list the system elements as we see them developing: They are regulating, programming, data recording, and computing. They should be integrated into the over-all system to produce the completely automated process.

New forms of regulating systems actually regulate qualities of the product, as does the gage regulator for cold-strip mills. Punched card programming and other forms of numerical input programming are becoming an integral part of reversing hot mills and other rolling mill drive systems. Automatic numerical data logging equipment is being incorporated into the electrolytic tinning line and rolling mill systems.

The last element to be incorporated into the steel plant is the computer. It might be used as a part of the recording system to evaluate the

C. R. CLINE
Engineering Assistant to the President,
Wheelabrator Corp., Mishawaka, Ind.

A. L. HODGE
Development Laboratory, Linde Co.,
division of Union Carbide Corp.,
Newark, N. J.

data. Later, it might be used to reprogram the regulating system to improve the product.

Mechanical Blast Descaling Gains for Wire Rod Cleaning

—C. R. CLINE

Mechanical blast cleaning has gone a long way toward eliminating pickling in many steel industry applications. In the case of wire rod processing, it consists of hitting the wire rod with a metallic abrasive. The abrasive is hurled by wheels, rotating at 2250 rpm.

Rod travel speed ranges from 200 to 600 fpm, depending upon the number of passes the rod makes through the blast pattern. The surface which results is minutely etched and retains the cold drawing lubricant.

A different type machine will clean 18 strands in a single pass after patenting.

Jet Reaction Burner Used To Boost Open-Hearth Heat

—A. L. HODGE

Liquid fuel atomization in open-hearth furnaces, using the energy of a jet reaction flame, has been suc-

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WHAT IS QUALITY?

"Quality."

Manufacturers claim it for their products. Advertisers speak of it in product promotion. Engineers ask for it. Salesmen sell it. Purchasing Agents try to buy it.

But, what *is* quality? How do you *recognize* it? How do you *know* you have bought it?

The dictionary says quality is "that characteristic which belongs to a body or object and helps to render it such as it is." Yet, this definition is meaningless *unless quality is interpreted in terms of a product's conformance to desired specifications.*

For example, suppose you need a spring which must meet specific operating requirements. Suppose you establish allowable tolerances for important characteristics, prepare specs, obtain bids, select a supplier. If your supplier's price is in line and if, by using proper testing equipment, techniques, and modern methods of Quality Control, he is able to deliver springs which meet your specifications—*he has supplied, and you have purchased,* "quality" springs.

If your supplier goes one step further by supplying you with a record of his tests (a Quality Report), you not only *have* quality—you *know* that you have it.

Every shipment of parts supplied by Hunter automatically includes a Quality Report (Q. R.) on tested characteristics.

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H. RUSSELL LOXTERMAN
General Sales Manager, Blaw-Knox Equipment Div., Blaw-Knox Co., Pittsburgh

cessful. Jet atomization increases steel production and lowers fuel consumption, compared to steam atomization. It produces a hotter, faster burning flame with increased thermal radiation to the bath. There are three reasons: 1. Jet-atomized oil is about 600° F hotter than steam-atomized oil. 2. Steam decreases the available heat in the high temperature zone by absorbing sensible heat and consuming heat of chemical dissociation. 3. Oil subjected to the high temperature of the jet flame undergoes pyrolysis and vaporization as well as extreme atomization.

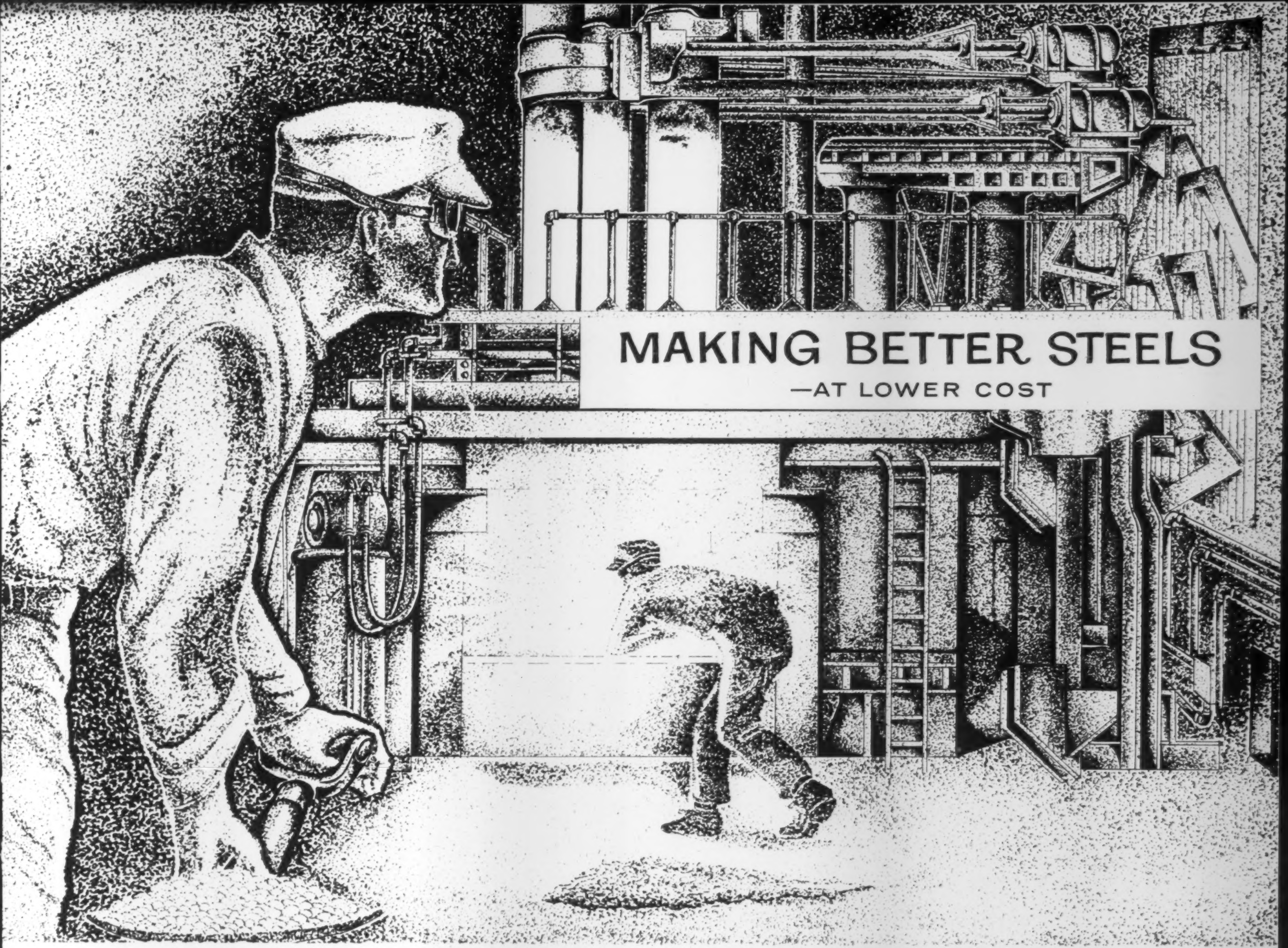
The jet burner uses a high velocity, hot gaseous flame to atomize and preheat the main liquid fuel before burning. The hot gases and jet energy are obtained by burning a small amount of gaseous or liquid fuel with air or oxygen under pressure in a specially designed combustion chamber. The main liquid fuel is then atomized by injection into the hot gas stream. The temperature and velocity of the jet flame vary from 3000 to 4000° F and from 1000 to 1500 ft per second, depending on operating conditions.

Steelmakers Renew Equipment During Business Slowdown

—H. RUSSELL LOXTERMAN

Steelmakers now have an opportunity to repair or rebuild marginal equipment to forestall heavy losses later this year when demand is expected to increase. This factor may bring about a better year for suppliers than production rate figures would seem to indicate.

Certainly, during the coming



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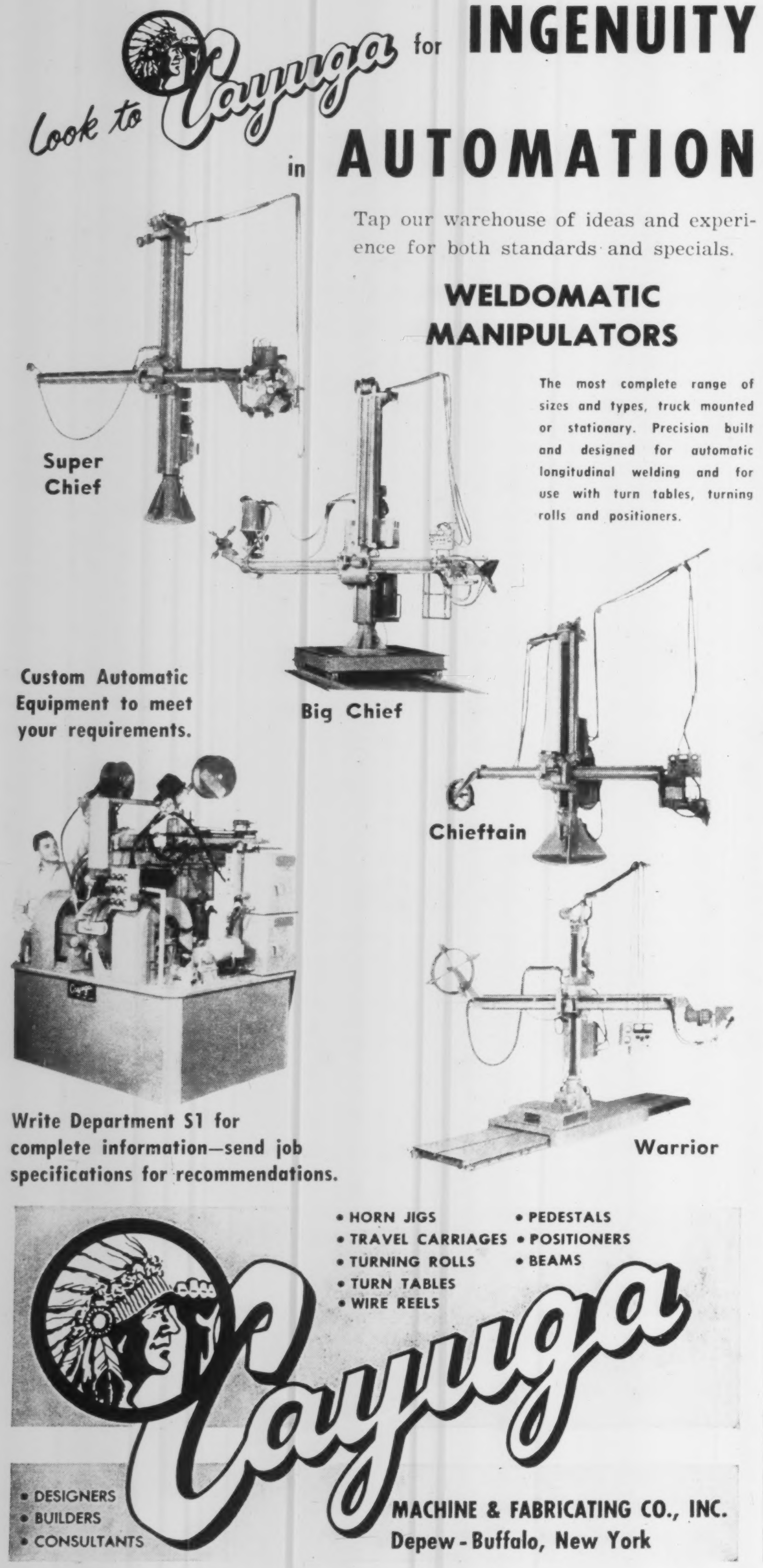

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R. E. BIRCH
Director of Research, Harbison-Walker Refractories Co., Pittsburgh

months, steelmakers will be examining new and more efficient methods for increasing production and saving on materials and labor.

Moving with this trend, we have designed an oxygen lance and hoist mechanism for open hearth furnaces. The accent is on increasing the yield without adding new furnaces.

We have also completed designs for making the feeding of ladle additions more automatic. Predetermined amounts of materials will be weighed and fed by the machine. The development results directly from the trend toward tapping larger heats and tapping more frequently. It brings about the need for larger material storage bins from which additions can be drawn and more automatic means of handling these materials.

Refractories Keep Pace With New Steel Processes

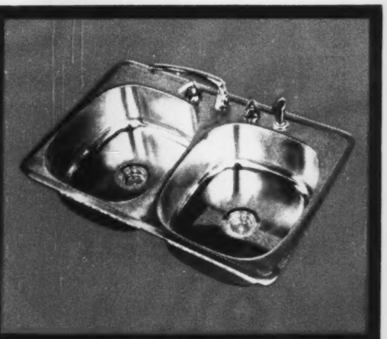
—R. E. BIRCH

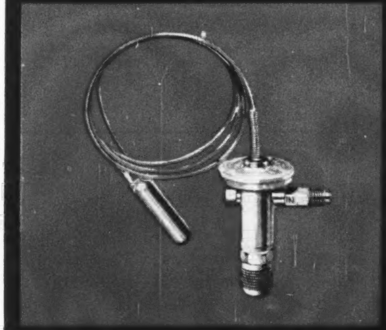
Refractories for the oxygen converter were an element of major uncertainty for steelmakers until the problem was solved. Now it has been demonstrated (by almost two years' experience) that commercially available, tar bonded basic brick add low maintenance to the other merits of the oxygen converter.

Progress in refractories for the all-basic open hearth roof has made it possible for two American plants to convert entirely to this practice. In the main, the roofs are of suspended construction, but there is some experimentation with fully sprung

THE LUSTER THAT SPARKED LOWER COSTS

A manufacturer of stainless steel sinks was confronted with polishing problems resulting from the deep draws in fabrication. After consultation with metallurgists from the House of Stainless, this customer switched to a high-luster finish of Type 430 at no increase in material cost. This change cut production time substantially and fewer polishing operations are now required.



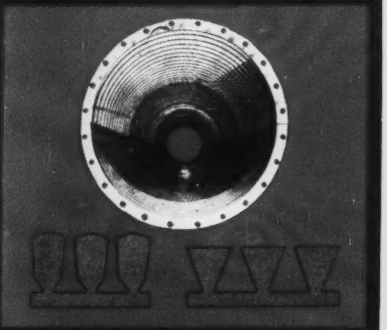


STAINLESS . . . WHERE IT COUNTS

In developing the control valve for automotive air conditioning, the manufacturer worked closely with CSS metallurgists to select the proper type of stainless to give each vital part the quality required. Parts subject to greatest wear are made from stainless with the maximum wear resistance. The hazards of corrosion are eliminated. The product reflects performance designed into it.

THE TOUGH ONES, TOO!

It takes unusual flexibility in material and service to meet the needs of this manufacturer of industrial screens used for sorting, filtering, cleaning and drying. Producing stainless wire and rod in the intricate shapes specified presented a real challenge. The House of Stainless came up with the answer, furnishing shapes such as illustrated.



THE DIFFERENCE THAT SAVED MONEY

In producing their line of automatic electric vaporizers, this customer used stainless steel for the upright electrodes in the heating element. The CSS sales representative suggested exploring other types of stainless for possible savings. With a slight change in design, the electrodes are now made from another type of stainless which met every requirement, yet made possible a savings of 20 per cent in these parts.

Give Your Products the BONUS BENEFITS of Stainless Steel

Now is the time to explore the possibilities stainless steel offers your product. Metallurgists from the House of Stainless will be glad to work with you in determining the type of stainless that can serve you most advantageously—for beauty, for durability, for resistance to corrosion, for over-all economy. Keep in mind that when you select stainless for one specific purpose, you get all its other qualities as a bonus.

You'll get all the help you need from CSS plus the most flexible service that supplies whatever stainless items you need from our complete warehouse stocks or from mill shipments through our connections with the leading stainless producing mills.

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FRANK CASHIN
Vice President, Kaiser Aluminum & Chemical Corp., Oakland, Calif.

arches, more closely approaching continental practice. This has been made possible by the development of a new series of basic brick and by the extension of metal casing to include inner steel plates in both burned and chemically bonded brick.

Other steel plant trends are the growing use of powerpressed semisilica refractories of precise size, in heating furnaces, soaking pits, and blast furnace stoves. Data show that the use of superduty fireclay brick linings in blast furnaces is having a pronounced beneficial effect on steel plant production.

Predicts Big Change In Basic Refractories

—FRANK M. CASHIN

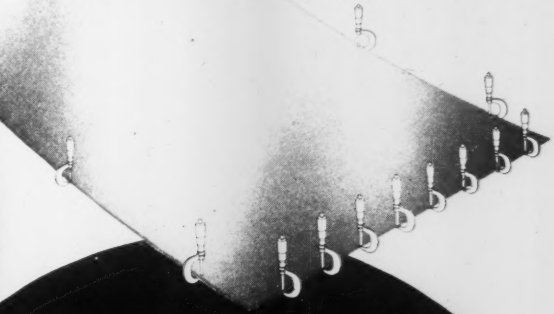
Although the steel industry operated at less than capacity in 1957, the basic refractory industry enjoyed its best year in history.

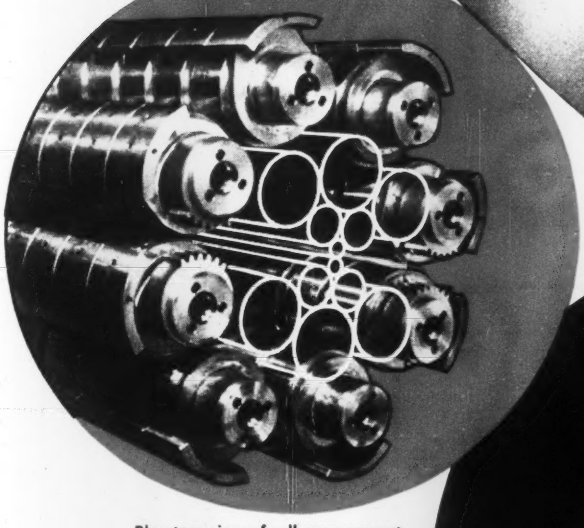
For example, there has been an upsurge in all-basic open hearth roofs. Most of them are of the flat suspension type, but now a few sprung roofs are beginning to appear even for large furnaces. Increased specialization of refractories in electric and open hearth installations is apparent. A new gunning system, including specially designed mixes, has been outstanding in maintaining tapholes and skewbacks. In addition, the trend toward using higher proportions of magnesia in furnace grains and mixes appears to be firmly established.

There are two great challenges to the basic refractory industry. First, we need to keep abreast of the newest developments in the steel indus-

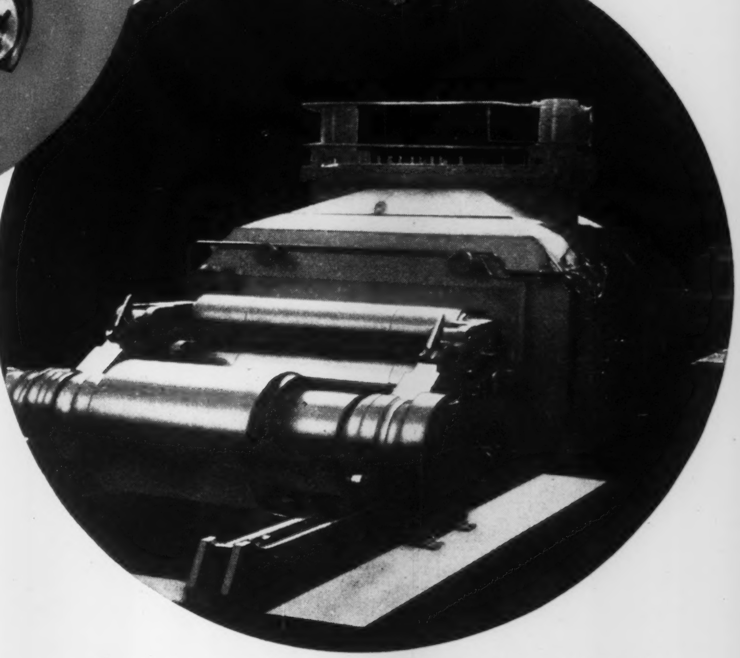
This 80" WATERBURY FARREL SENDZIMIR MILL

maintains precise gauge across the width and along length of strip





Phantom view of roll arrangement



This Sendzimir cold strip mill rolls 80" wide low carbon steel from hot rolled thickness to .024" with total gauge variation of .0004". Similar uniformity is being regularly obtained on Sendzimir cold strip mills rolling brass, copper, aluminum, stainless steel, silicon steel, etc.

CONSIDER THE ADVANTAGES OF THE SENDZIMIR COLD MILL

- Extreme Accuracy In Gauge, Due To Uniform Support Throughout Mill
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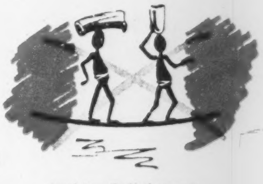
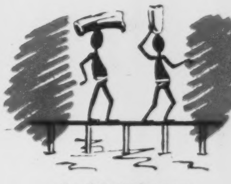
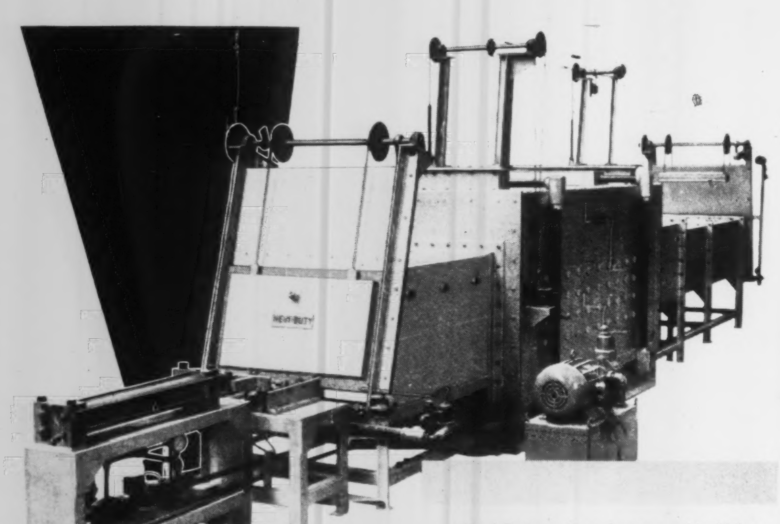


Backing Roll Support



Sendzimir Support



Hevi-Duty pusher furnace with 21" wide heating chamber for volume production. Optimum results are produced by multiple zone temperature and atmosphere control; and a 14 foot cooling chamber.

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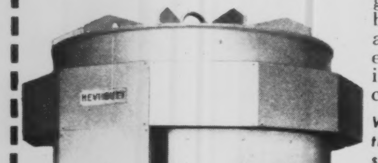
FURNACES FOR SINTERING under a Controlled Atmosphere or Vacuum

CONTINUOUS PRODUCTION FURNACES — Your production sintering requirements can be met by Hevi-Duty pusher or conveyor furnaces; temperatures to 2500°F. Multiple zone temperature control and a variable speed drive will insure uniformly perfect sintered compacts. High temperature electric heating elements reach desired operating temperatures rapidly.

Hevi-Duty exothermic or endothermic atmosphere generators provide the range of gases necessary for sintering.

VACUUM FURNACES — Hevi-Duty pit or bell type double pump vacuum furnaces provide temperatures to 2100°F. Vacuum sintered parts show greater homogeneity and density, and better ductility than those conventionally sintered. This method is often less expensive and the elimination of gas inclusions reduces mechanical or physical defects.

Write for Bulletins 357 and 557 to determine the Hevi-Duty furnace best suited for your sintering requirements.



Hevi-Duty bell type double pump vacuum furnace for sintering at 2100°F. Standard pit or bell type vacuum furnaces are available with uniform working zones up to 54" in diameter by 144" high.

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Dry Type Transformers   *Constant Current Regulators*

C. R. AUSTIN

Manager, Steel Plants Development, Kaiser Engineers, division of Henry J. Kaiser Co., Oakland, Calif.

try to continue to provide refractories which will do the most efficient job possible. Second, we feel that in the near future we will see a major breakthrough in establishing a substantial change in our present concept of basic refractories.

More Use for Atomic Energy Foreseen in Steel Industry

—C. R. AUSTIN

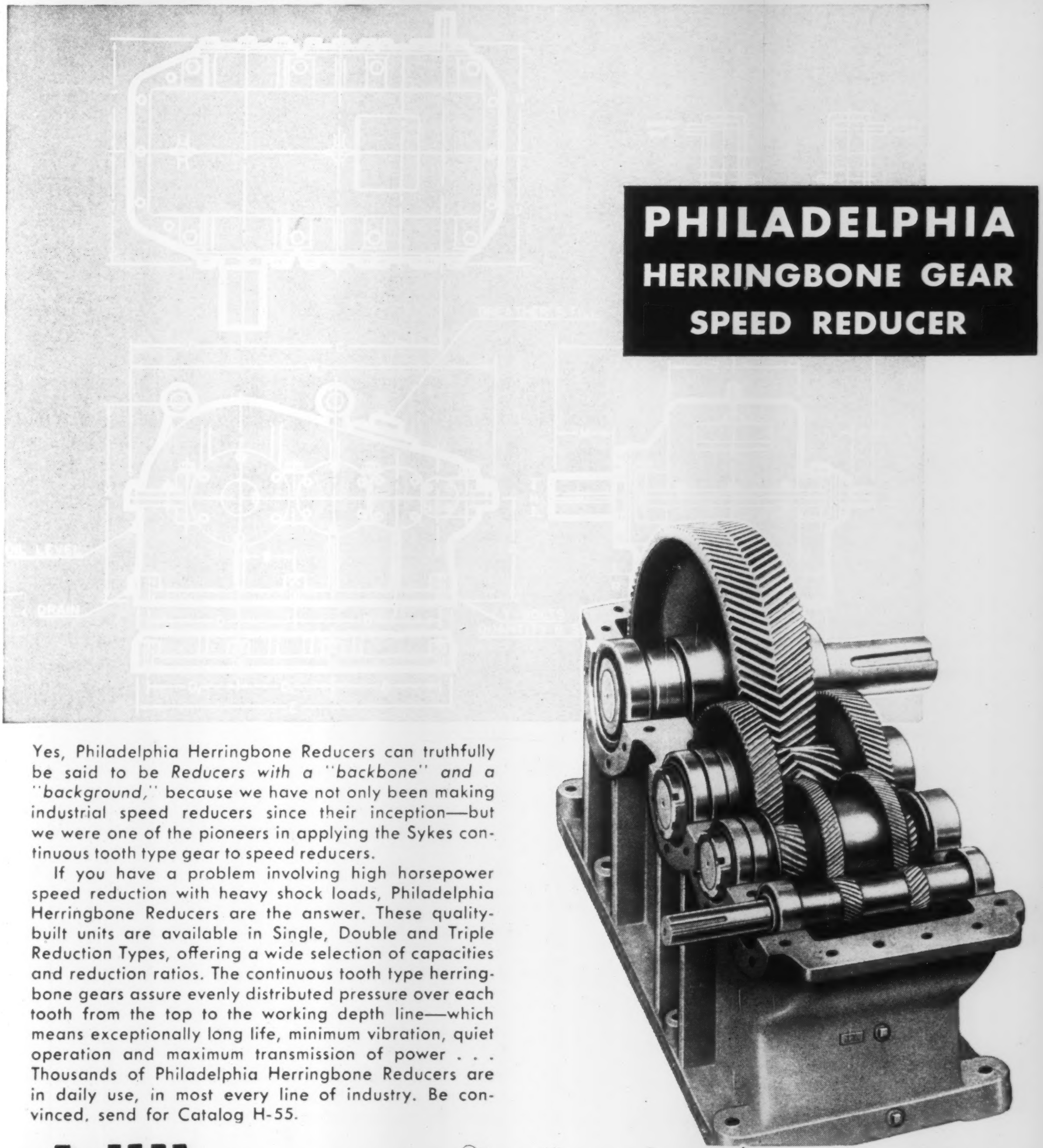
Atomic energy techniques are finding their way into the steel industry.

Cobalt 60 may be used to determine and control sinter density. In byproduct plants, radioactive tracers could have wide application in providing continuous purity control of benzol, toluol, xylol, and solvent naphtha. By activating iron ore, it is possible to know which of several iron-bearing materials charged simultaneously in the blast furnace produces the most flue dust.

The phosphorus content of openhearth slag might be determined rapidly and continuously by the addition of small amounts of radioactive isotopes. Similarly, the source of undesirable nonmetallics could be established. In the areas of rolling and coating, new types of gaging equipment utilizing x-rays and beta particles provide continuous thickness measurements to a degree not possible by mechanical means.

These are but a few examples of what may be expected as information in a hitherto unexplored field becomes available to the steel industry. An alert management will actively seek advice on how knowledge from the vast area of atomic energy can be of use in the production of steel.

Here's the Reducer with a BACKBONE . . . . and a BACKGROUND



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Yes, Philadelphia Herringbone Reducers can truthfully be said to be *Reducers with a "backbone" and a "background,"* because we have not only been making industrial speed reducers since their inception—but we were one of the pioneers in applying the Sykes continuous tooth type gear to speed reducers.

If you have a problem involving high horsepower speed reduction with heavy shock loads, Philadelphia Herringbone Reducers are the answer. These quality-built units are available in Single, Double and Triple Reduction Types, offering a wide selection of capacities and reduction ratios. The continuous tooth type herringbone gears assure evenly distributed pressure over each tooth from the top to the working depth line—which means exceptionally long life, minimum vibration, quiet operation and maximum transmission of power . . . Thousands of Philadelphia Herringbone Reducers are in daily use, in most every line of industry. Be convinced, send for Catalog H-55.

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Technical Director, Aluminium Ltd. Sales Inc., New York

CHARLES RIETH
Manager, Nickel Sales Div., National Lead Co., New York

WILLIAM M. MOFFATT
Executive Vice President, American Brass Co., Waterbury, Conn.

WALTER F. O'CONNELL
Executive Vice President, Olin Aluminum Div., Olin Mathieson Chemical Corp., New York

FORUM ON TECHNICAL PROGRESS

Nonferrous Metal Production

Aluminum Sales Are Spurred By New Ingot Forms, Alloys

—FORREST M. PALMER

New products and markets for aluminum will be developed this year. Aluminium Ltd.'s research and development personnel are working on new alloys and producing techniques, and on new industrial uses.

Increased emphasis is being placed on development of improved forms and new alloys for ingots. T-1500 and T-750 remelt ingots offering special economies to customers, already introduced, will be followed by better extrusion alloys as well as advanced alloys and techniques for anodizing. In application development, further progress can be expected in welding as well as intensifed development in packaging and railroad rolling stock.

Civilian Nickel Supply Adequate To Meet Foreseeable Demand

—C. C. RIETH

While the nickel market has been in the doldrums lately, this situation is not expected to continue indefinitely. Contributing to the present easier situation has been the fluctuating business in many industries, cutbacks in military orders requiring nickel, and the additional production that became available during the past year, particularly from Nicaro.

It is believed nickel will not face a "runaway" market again, barring of course some unforeseen international developments. This should encourage the various nickel-consuming industries to relax their efforts in designing away from its use.

If consumers can feel a reasonable assurance in securing all the nickel they reasonably require, at a fair price, this should contribute materially in keeping nickel in a prominent position.

Brass Mill Sales May Pick Up As Former Users Return to Fold

—WILLIAM M. MOFFATT

There has been a substantial amount of evidence in the past year that former users of copper and brass mill products, lured away by substitute materials, are returning to the fold.

Logical, economic reasons exist for this reversal. First in importance is the steadily increasing supply of copper brought about by the opening up of new reserves in various parts of this country and abroad. This increase in availability has served as a steadying influence and has balanced supply and demand. The result is that copper products are substantially lower in price than they have been for several years.

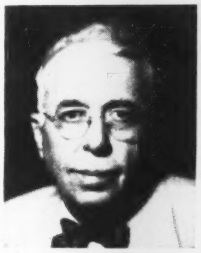
There are other indications. Some examples are the increasing applications of copper and brass products in modern electronics; a distinct cyclical trend to copper, brass, bronze, and nickel silver in architectural design; expansion in power generating and distribution facilities; and another boom year in construction. These and others of significance portend a host of continuing progressive developments in our industry.

Aluminum Consumption To Rise By 10 Per Cent This Year

—WALTER F. O'CONNELL

We expect aluminum consumption this year to increase 10 per cent over what it was in 1957. The metal will

R. DAVISON
Manager, Market Development Div.,
New Jersey Zinc Co., New York



W. LUNSFORD LONG
President, Tungsten Institute
Warrenton, N. C.

JERRY SINGLETON
Executive Secretary
Magnesium Assn., New York

T. W. LIPPERT
Director of Marketing, Titanium
Metals Corp. of America, New York

make gains in the architectural, electrical, automotive, and disposable food container fields.

Greater application of aluminum building panels in schools, hospitals, and single family residential housing can be expected this year. A variety of surface treatments, the development of semifabricated structural components, and the continuing trend of color in architectural metal will be responsible for the increase.

Improved techniques of joining will result in further uses in the electrical industry, particularly in products other than wire and cable.

Zinc Diecasting Uses Expanding Into Industry's Largest Market

—R. DAVISON

When the final figures are in, 1957 may have marked the year when diecasting became the largest market for zinc (it has long been the largest consumer of Special High Grade). An over-all increase of some 10 per cent per passenger car (involving both functional and decorative applications) will contribute importantly to a further upsurge.

Rolled zinc finds a large application in batteries. Transistorized electronic equipment and battery-operated toys and appliances have increased the demand for standard-size batteries. Research and development programs in guided missiles and space flight rely heavily on batteries.

Optimistic reports from tests and other developments in the field of cathodic protection for ships and marine installations are bringing about an increasing use of zinc in that area.

Continuous line galvanizers are further expanding their facilities to meet an anticipated increase in demand for buildings, highway construction, and air conditioning. The variety of formed and drawn products will continue to increase.

Tungsten's Potential Helped By High Temperature Alloys

—W. LUNSFORD LONG

Many new uses for tungsten were developed last year.

According to a recent report of the attorney general on the Defense Production Act, its most important use in weapons has been in cores for high velocity projectiles. He also states: "Tungsten's heat resistance and strength make it widely acceptable in alloys for jet engines and missiles."

A new alloy (WI-52) has been developed by Stanford Research Institute. It has a 1000 hour rupture strength of 15,000 psi at 1700° F.

A tungsten carbide abrasive may largely supplant sandpaper. Available in five grits, it is used in sanding, shaping, and sawing woods, plastics, and composition materials. As a wheel, it can saw, shape, and sand.

Look for the introduction of a tungsten-base alloy that will play an important role in solving many problems in the combustion chamber of jet engines and high temperature applications in nuclear power plants. Conventional engines are requiring stronger steels in which tungsten is an important component.

Magnesium's Markets Increased By New Technical Developments

—JERRY SINGLETON

Two important developments occurred in the magnesium industry during 1957. First, shipments of wrought forms of the metal continued to close the gap on cast forms, indicating a widened use of magnesium by small quantity users. Second, there was accelerated perfection of fabricating processes which previously had been only laboratory accomplishments. Examples: Dip brazing and consumable electrode welding.

The general acceptance of the HK and HM alloys for uses demanding high strength-to-weight ratios in the 500 to 750° F area has widened markets which hold remarkable promise.

Extruded forms of magnesium, from major aircraft parts produced on a 13,500-ton extrusion press down to little known but widely used extruded anodes in household water heaters, have opened new markets. Electronic applications, in particular, show great promise.

Developments in metal production during 1957 were of major importance. Purchase of the Velasco, Tex., plant by Dow Chemical Co., start of construction of the Selma, Ala., plant by Alabama Metallurgical Corp., and the continued interest of at least one buyer in the government's Painesville, Ohio, facilities, seem to assure two or more sources of magnesium from 1958 forward.

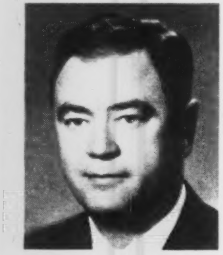
Titanium Metal Loss Reduced By New Furnaces and Equipment

—T. W. LIPPERT

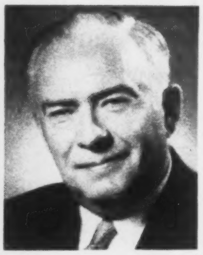
The year 1957, which began as the titanium industry's best, then slid off to matching 1956's shipments, can be considered the year titanium came of age.

Commercial production of foil, precision extruded shapes and tubing, and heat treatable alloys became a reality. Significant progress was

F. H. VANDENBURGH
Vice President & General Manager
Mallory-Sharon Titanium Corp.
Niles, Ohio



D. A. RHOADES
Vice President & General Manager,
Kaiser Aluminum & Chemical Corp.,
Oakland, Calif.



W. STILLMAN ELFRED
Executive Vice President, Western
Brass Mills Div., Olin Mathieson
Chemical Corp., New York

GEORGE PERKINS
General Director, Product Development,
Reynolds Metals Co., Louisville

made in reducing metal loss—a costly area which has plagued producers in their drive to constantly lower prices.

Two examples of progress in this area can be found in TMCA's operations. At Henderson, Nev., new melting furnaces capable of incorporating 25 to 30 per cent scrap in melting 7500-lb ingots have gone into operation. At Toronto, Ohio, TMCA has begun production from the world's first facility devoted exclusively to rolling and forging titanium. Specially designed and highly instrumented equipment already have shown metal loss can be reduced considerably.

Prices continued their downward trend. On June 3, TMCA initiated mill product price reductions averaging 10 per cent. Du Pont followed this action by lowering the price of sponge to $2.25 a pound. Total effect of the price activity: Mill products now 33 per cent lower than in 1954; sponge prices, more than 50 per cent lower.

Titanium Industry Eyes Civilian Market

—FRANK H. VANDENBURGH

The titanium industry has surplus capacity because of aircraft program cutbacks and stretchouts. But the situation has its bright side for the user and fabricator. It is giving the industry an opportunity to improve sales, scheduling, and supply operations, which will benefit the fabricator. It will undoubtedly hasten commercial development.

The long term outlook in the military field continues to look good. The shift from manned aircraft to rockets and missiles has coincided with the introduction of new alloys with attractive properties for high temperature applications.

One of our new alloys is a weldable sheet and bar material that offers strengths equivalent to similar titanium alloys at temperatures 200° F higher. Another can be heat treated to high strengths but is remarkably easy to fabricate in the solution treated condition.

With decreasing prices and the accompanying increase in volume, titanium will become more competitive with other metals; many uses in the civilian product field will open up.

Greater Supply of Aluminum Spurs New Large Scale Uses

—D. A. RHOADES

The greater availability of aluminum has real significance for manufacturers and fabricators. For the first time since World War II, new tonnage applications are possible. Such abundance is a powerful stimulant to new developments.

For example, the automotive industry substantially increased its use of aluminum in 1958 models—chiefly in decorative trim. A number of functional applications have been standard for several years. There are signs of more important usage in the future. An aluminum wheel is already offered by one manufacturer, and there will be a wider acceptance of the integrally cast wheel and brake drum. The aluminum engine block is recognized as technically and economically feasible; in time it will become another large volume application.

Other technical advances are extending usage in many fields. Perhaps the most spectacular is the aluminum can.

Brass Mill Sales To Increase, Buyers To Rebuild Inventories

—W. STILLMAN ELFRED

Brass mill products should account for a larger share of the nonferrous market this year. Several factors will be responsible:

In the last few months, inventories at consumer plants have been at a minimum. Their replacement alone will result in increased demand during the first quarter.

Last year, many manufacturers of consumer products began to encounter public buying resistance to products using substitute materials. We believe that they will have to use brass and other copper-based alloys.

Technical research and sales engineering will get increasing attention from brass producers in 1958. New facilities, improved manufacturing techniques, and a more reasonable price for copper will permit brass mill products to assume a favorable price relationship with other metals. This year's production schedules for copper and zinc assure a raw material supply sufficient to meet an increased demand for brass mill products.

In addition to increased uses in industry, greater brass applications can be expected in residential housing. This year will also see new uses of brass in hardware, appliances, and as decorative materials.

New Fabrication Techniques Strengthen Aluminum's Future

—GEORGE PERKINS

Aluminum continued to expand in major markets last year.

New finishes which are attractive and durable have increased the versatility and desirability of architec-

in tomorrow's
stepped-up
competition
for sales—

is anything less than

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good enough
for your car?—

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- sales-making first, second and always

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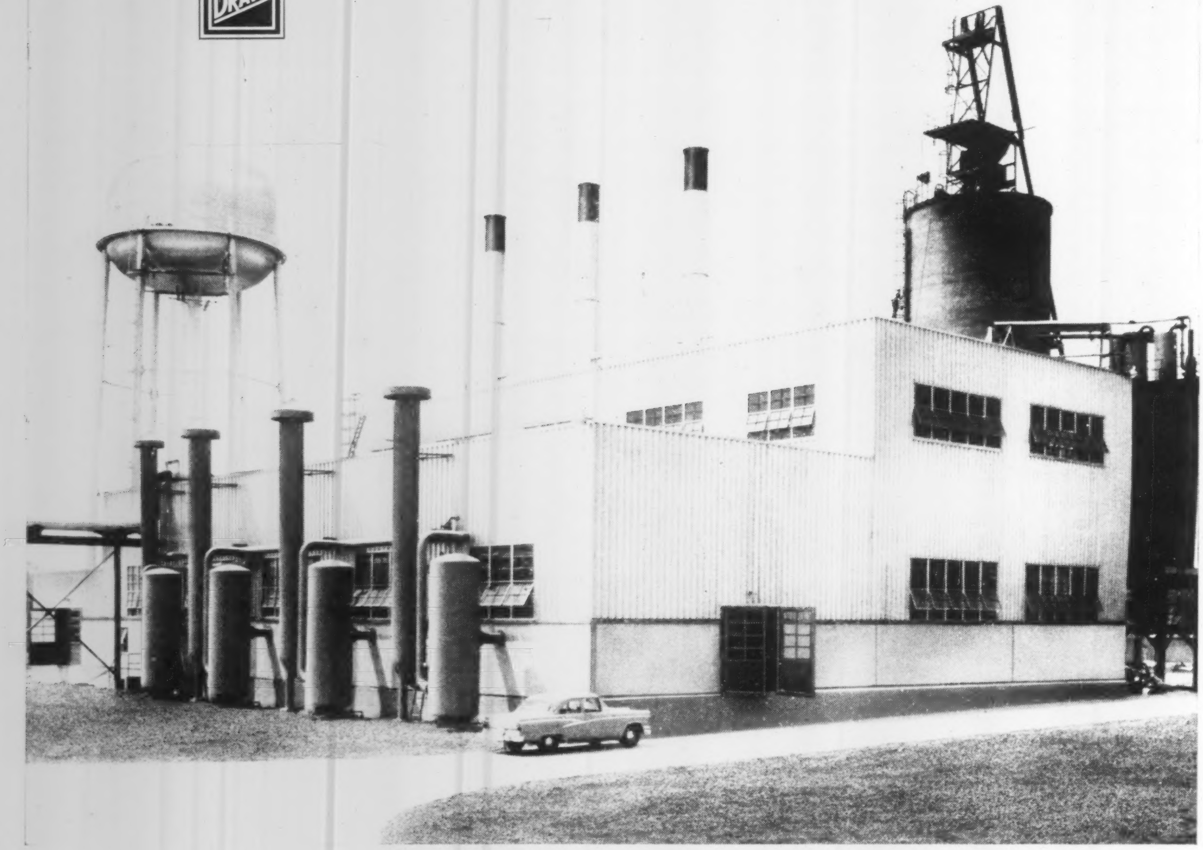

Five "turn-key" boiler plants for FORD

Five new Ford Motor Company factories will have Dravo-built steam generating and air compressor plants similar to this one in Sterling Township near Detroit. Three are in operation, the fourth and fifth are under way. First of these turn-key projects was built in 1955. Ford engineers specified design requirements . . . Dravo handled engineering-construction, procured equipment and erected the complete plant.

Dravo has built more than 80 power and steam generating plants for both industrial and central station use. The combination of pipe fabrication facilities and construction experience produces low cost plants that are economical to operate and maintain.

Your next construction project may benefit by making use of this teamwork. For information on this, or any of the products and services listed below, write DRAVO CORPORATION, PITTSBURGH 25, PENNSYLVANIA.

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Blast furnace blowers • boiler & power plants • bridge sub-structures • cab conditioners • docks & unloaders • dredging • fabricated piping

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river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation tural aluminum. They have been achieved by Alclad surfaces that provide distinctive anodized finishes, by special mill practices that produce distinctive textures, and by refinement and standardization of anodizing practices to establish specifications that insure consistent color, texture, and dependability.

The automobile industry continues to show increased interest in aluminum. But automobiles are not the only element of the transportation industry taking more metal. A Canadian railroad purchased 8000 aluminum roofs for boxcars; refrigerator car builders have shown definite interest in aluminum floors, floor racks, liners, and hatch covers; and small orders have been placed for aluminum boxcar doors.

Several developments, including new alloys for high strength at elevated temperatures, aluminum coupled with other metals, and reinforced aluminum sheets, indicate that the metal may have the answers to design for ultrahigh speed.

Strip conductors, insulated by anodic films or plastic films, are being used in many newly designed electrical coils. Higher strength alloy wire has increased the versatility of aluminum electrical cables.

Tin Plate Facilities Expand, Bronze, Solder Uses Grow

—LYNN W. MEEKINS

Tin will continue to be widely used in American industry this year.

Better ways to make and test tin plate were found in 1957. Nearly three-fifths of the primary tin consumed in the U. S. goes into tin plate, and four-fifths of it is used for containers. The remaining fifth has diverse applications, including those in the automotive industry, utensils, general purpose industrial equipment, electrical equipment, sporting goods and toys, construction and maintenance, plumbing and heating.

Millions are being invested in the expansion of tin plate manufacturing facilities. In mid-1957 the U. S. had the capacity to produce 7.3 million tons of tin mill products a year. Output in the first half of 1957 was over 3.6 million tons. The industry plans to add 1 million tons to its capacity by 1959 to handle growing demand.

Solder, taking about one-fifth of the primary tin used in the U. S., continues to be the subject of extensive research and development. Electrical and electronics firms, container manufacturers, radiator and heat-exchanger makers, and the plumbing industry are the largest users.

Bronze, accounting for about half of the remainder of U. S. tin usage, has become an increasingly important product of continuous casting and of powder metallurgy. Most prominent among the other metallurgical uses are plating, babbitt, and white metal. Many recent electrodeposition studies have revealed new advantages of tin and tin-alloy platings. The consumption of white metal for pewter ware and costume jewelry has grown impressively.

Alcoa Optimistic on Aluminum, Expansion of Facilities Continues

—JOHN D. HARPER

Despite the present oversupply of aluminum, Alcoa is optimistic about the future and is planning accordingly.

In 1957, the company spent approximately $160 million for smelting, mining, refining, and power facilities. More than $80 million is already programmed in the company's expansion budget for 1958.

At the Point Comfort, Tex., smelting plant, a new potline will be ready for operation by March 1. This will add 40 million lb annually to installed capacity there.

Near Evansville, Ind., Alcoa has under construction a new smelting plant which will utilize electric power generated in a coal-fired steam plant. Initial operation is scheduled for late this year. Ultimate installed capacity will be 300 million lb, but production schedules will depend on business trends.

Work is also progressing on two new potlines at Alcoa's Massena, N. Y., Works. Massena's installed capacity will be increased by 75 million lb upon the completion of this project.

An alumina refinery to be completed this year at Point Comfort will replace an older refinery at East St. Louis, Ill.

Magnesium Eyes Newer Markets, Military Orders To Pace Growth

—J. D. HANAWALT

The near-term outlook for magnesium is bright. Military nonaircraft may almost overnight become a prime consumer. Magnesium-thorium alloys should enjoy vastly larger markets in aircraft and missiles.

Other fields look equally promising: Magnesium figures to capture a far larger share of its tooling-plate potential. Magnesium photoengravings, as a replacement for both copper and zinc, may become a multimillion dollar market. Rising operating costs ultimately could force a definite quest for weight reduction in the auto industry and accelerate the established lightweight trend in truck and trailer bodies.

LYNN W. MEEKINS
Director, Malayan Tin Bureau
Washington

JOHN D. HARPER
General Manager, Smelting Div.,
Aluminum Co. of America, Pittsburgh

J. D. HANAWALT
Vice President & Manager, Magnesium
Dept., Dow Chemical Co.
Midland, Mich.

During 1957, magnesium uses for alloying aluminum (still the largest single application for the metal) showed a modest gain almost directly proportional to the consumption of the nonferrous leader. New markets appeared in the thermal reduction of beryllium, zirconium, and uranium. (Some 4 pounds of pure magnesium

the trend is to THOMAS *for*

PRODUCTION BENDING

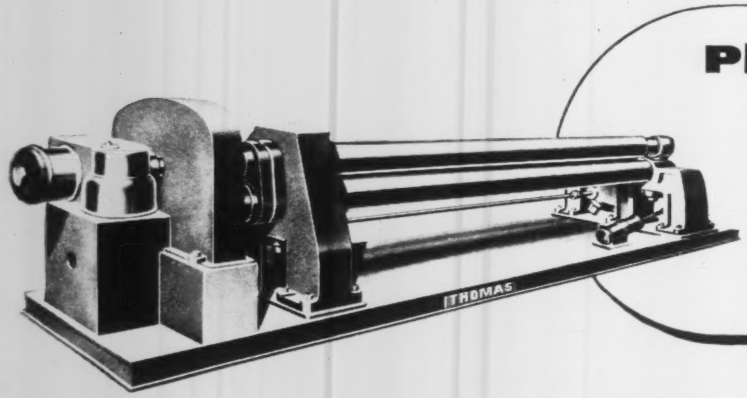
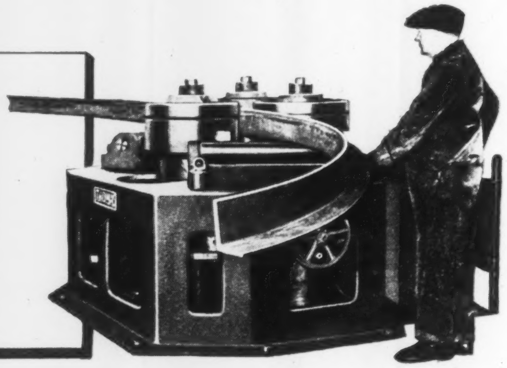


Plate Bending

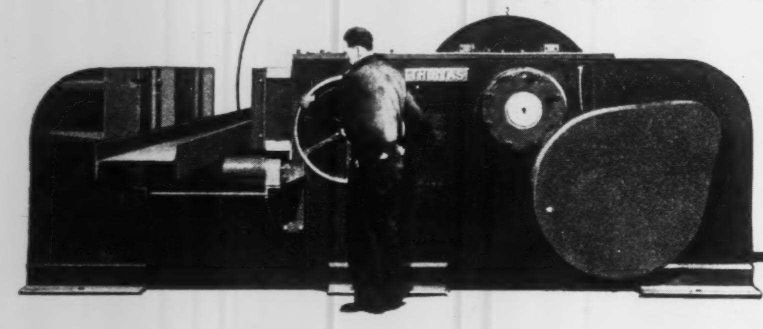
The Thomas line of Initial or Pinch Type Plate Rolls is comprised of twelve sizes of all steel machines completely modern in design. Features include enclosed drive running in oil; power adjustment and power drop-end.

Angle Bending

Thomas All Steel Angle Rolls are built in both vertical and horizontal styles, and capacity range is from 2 x 2 x ¼" to 6 x 6 x ⅞" angles. Shapes other than angles may also be bent by using special rolls.



Bending and Straightening



Thomas All Steel Bending and Straightening Machines, for cold working of structurals; Bars; Billets; Rails and other shapes, — built in six sizes — from 50 to 400 tons.

The machines shown are but a few of the types Thomas builds. If you have an equipment problem which involves Bending, Shearing, Pressing or Punching call on us.

Our Engineers are available for consultation without obligation.

PUNCHES • SHEARS • PRESSES • BENDERS • SPACING TABLES

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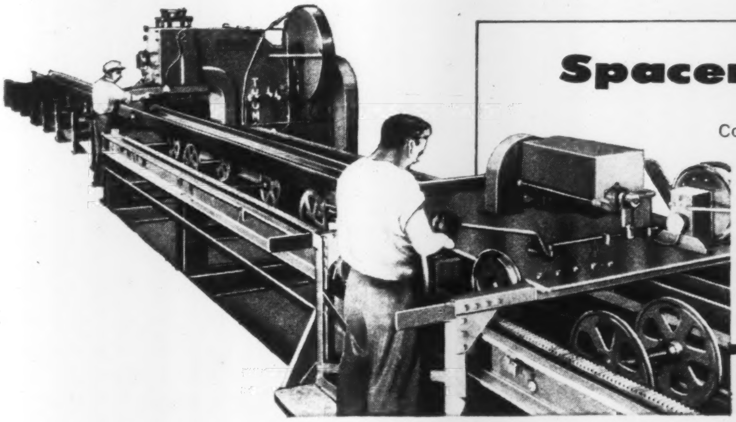
PUNCHING and SHEARING

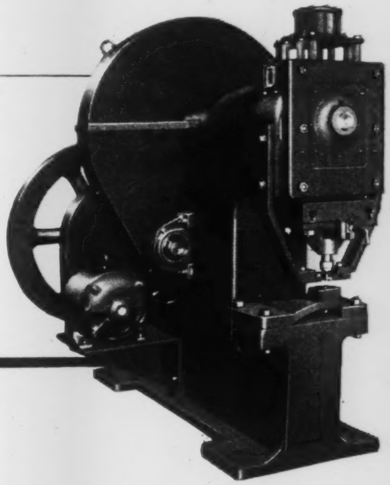


Spacer Punching

Complete elimination of layout costs is a major saving when Thomas Spacing Machines—either Motorized Indicator or Full Automatic — are used. Additional advantages are greatly reduced material handling; faster punching and greater accuracy.

Detail Punching

Thomas builds Detail Punches in a wide range of sizes. These, too, have all the modern design features such as Push Button Clutch Control; Anti-Friction Bearings; Steel Gears and Air Counterbalance.



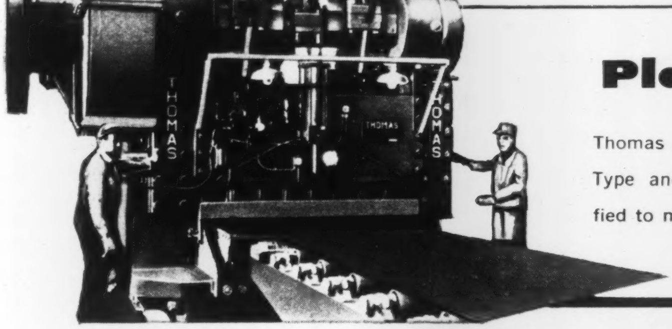


Plate Shearing

Thomas Plate Shears are of the Heavy Duty Mill Type and are individually designed or modified to meet individual customers' requirement.

Thomas also builds BAR Shears, BILLET Shears, Double ANGLE Shears, Wall DRILLS and other machines for the structural fabricator.

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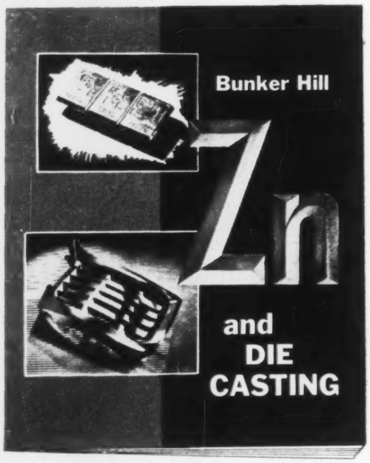

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are required to reduce each pound of beryllium.) Production of ductile iron rose slightly, effecting a proportionate increase in magnesium used in the process.

Years of research in magnesium-lithium alloys appear to be paying off with the development of an ultra-lightweight alloy—half the weight of aluminum—with promising armor characteristics. Dow is building from the alloy an experimental hull for an armored personnel carrier. Development work is moving forward on lightweight, portable shelters and other quartermaster equipment.

Brass Outlook Better, More Mills Automate

—T. E. VELTFORT

The over-all outlook for the copper and brass mill products industry in 1958 is promising. Residential building, which lagged in 1956 and 1957, is expected to improve. It will mean increased use of copper products in plumbing and heating systems, flashing, gutters, downspouts, exterior and interior hardware, and lighting fixtures. Copper and its alloys also will be important in the remodeling and renovating of plumbing and heating systems.

In the auto industry, copper and brass will continue to be important. The ever-growing electronic computer field finds many vital uses for the red metal and its alloys. The Remington Rand Univac II, for example, uses more than 15,000 lb of copper, brass, and bronze.

The industry has many new and expanded facilities. Two examples: A new automated copper tube mill at Cleveland and an integrated plant at Paramount, Calif. At the Cleveland mill, improved yields and reduction in manufacturing costs are expected to make copper tubing available in markets not previously reached. Among the facilities at the Paramount mill is a quintuple die, copper tube draw bench that will produce five tubes at once, each 125 ft long.

Lead Uses Continue To Expand In Atomic Energy Applications

—ROBERT L. ZIEGFELD

Lead is keeping pace with progress in the atomic field. Several packaged reactors are now on the market which use lead for shielding or for reflectors. The exact type of shielding which will be used on the first commercial atomic ship has not been decided upon but the designers are working on a sandwich type. One of the important materials in this is lead. In addition, huge monolithic lead doors weighing about 15 tons are used in caves or cells where isotopic sources are stored and utilized. Lead containers of similar weight are being used to ship spent fuel element sources from reactors to radiation laboratories throughout the country.

Leaded steels are receiving a great deal more attention because the lead improves machinability without materially affecting other properties of the steel. New applications are being found in steel castings and forgings.

High lead, low firing porcelain enamels are beginning to find commercial applications on steel. Besides the advantage and cost saving of low firing, cheaper grades of steel may often be used and the enamel covers edges and corners better with greater resistance to chipping.

Other new uses: 1. Lead additions to ceramic bodies. 2. A red lead-zinc dust paint for use on new galvanized surfaces. Tests covering more than five years have been successful.

More interest is being shown in thin sheets of antimonial lead for architectural applications. More than 3,000 sq ft of this material was installed on a new building at Duke University last year.

Titanium Sponge Output Hit 16,000 Tons Last Year

—S. M. NORWOOD

The transition from conventional aircraft to missiles and rockets, together with efforts of the government to economize, resulted in a reduction in orders for military aircraft. Since titanium was used almost exclusively for military aircraft, the industry was dealt a severe blow.

Early last year, Electro Metallurgical Co., a division of Union Carbide Corp., put its Ashtabula, Ohio, titanium sponge plant into full capacity operation (7500 tons per year). The first plant to use the sodium reduction process in the U. S. became the largest producing plant. The nation's total sponge capacity rose to 30,000-35,000 tons per year. But it is estimated that only about 16,000 tons of sponge were produced in 1957.

The requirements for titanium will probably not increase significantly for the next several years. Improvement in the situation will depend largely on giving the user more for his titanium dollar. A wealth of knowhow is being accumulated; out of it will come increased usefulness of titanium and lower production processing costs.

THEODORE E. VELTFORT
Managing Director, Copper & Brass Research Assn., New York

ROBERT L. ZIEGFELD
Secretary-Treasurer, Lead Industries Assn., New York

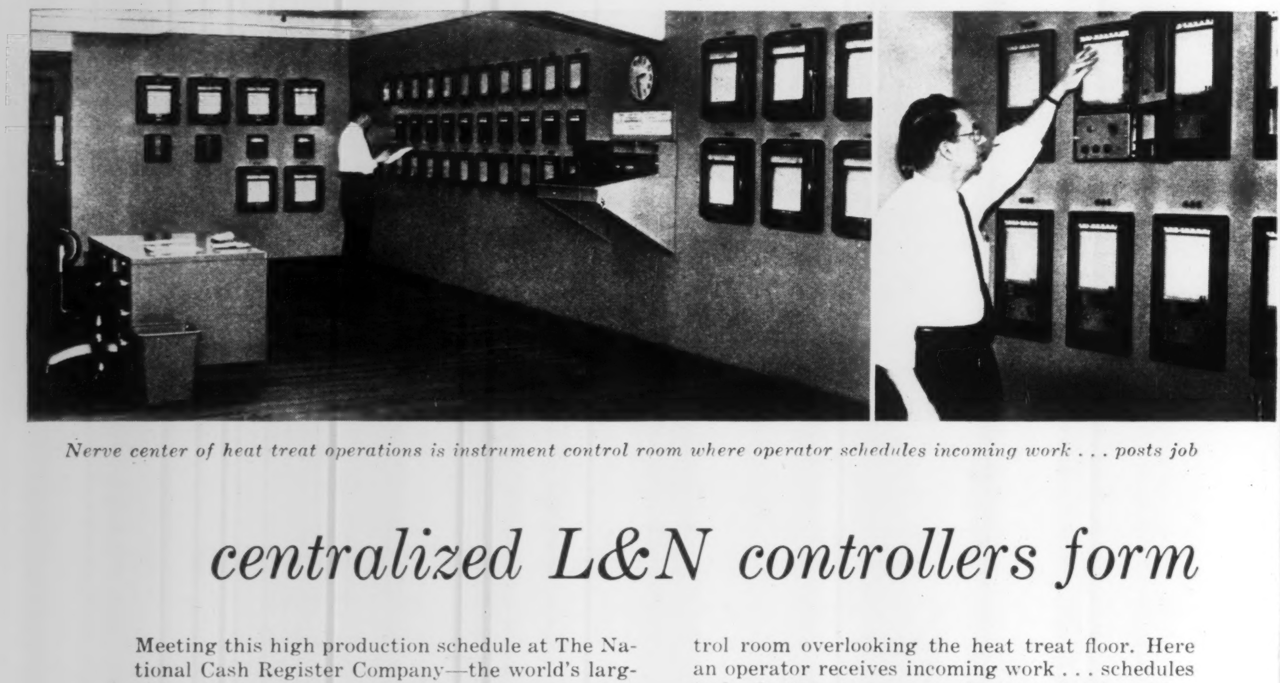
S. M. NORWOOD
Vice President, Electro Metallurgical Co., Div. of Union Carbide Corp., New York

The new, higher strength alloys being introduced will open new horizons. With more titanium now released for civilian use, the industry can concentrate on developing a healthy market in the chemical processing, pulp and paper, marine, electronic, aviation, and automotive industries. Increased usage is expected to proceed slowly, but titanium will grow to be a significant material of construction. In the next ten years, we expect a growth to an annual usage of 20,000 to 25,000 tons of mill products, or four to five times production in 1956—the peak year.

(*Please turn to Page* 250)

At The National Cash Register Company, furnace man inserts work in continuous carburizer—

How The National Cash Register Co.



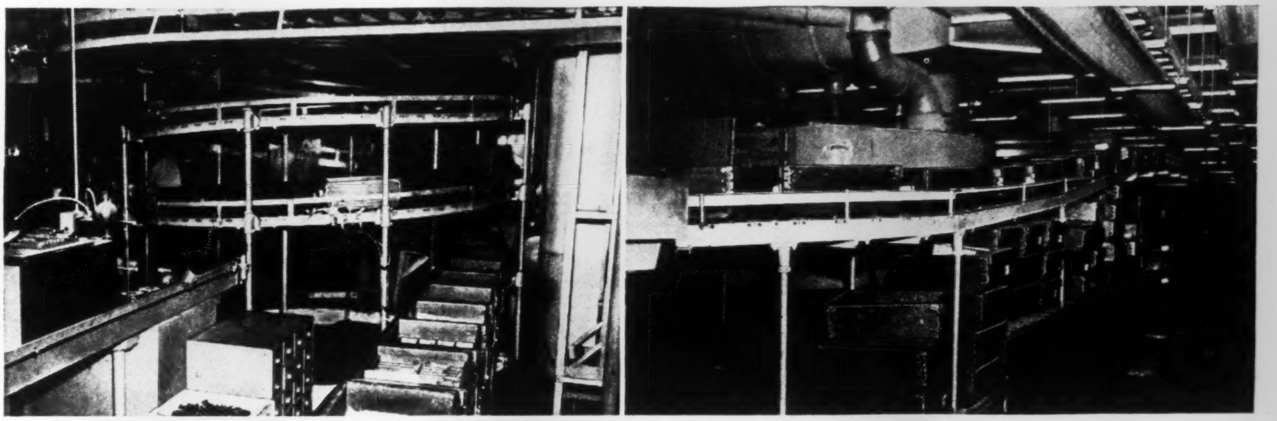
Nerve center of heat treat operations is instrument control room where operator schedules incoming work . . . posts job

centralized L&N controllers form

Meeting this high production schedule at The National Cash Register Company—the world's largest manufacturer of cash registers and a leading producer of accounting and adding machines—is due to the right combination of material handling, scheduling and the unique *temperature control center for the heat treat department.*

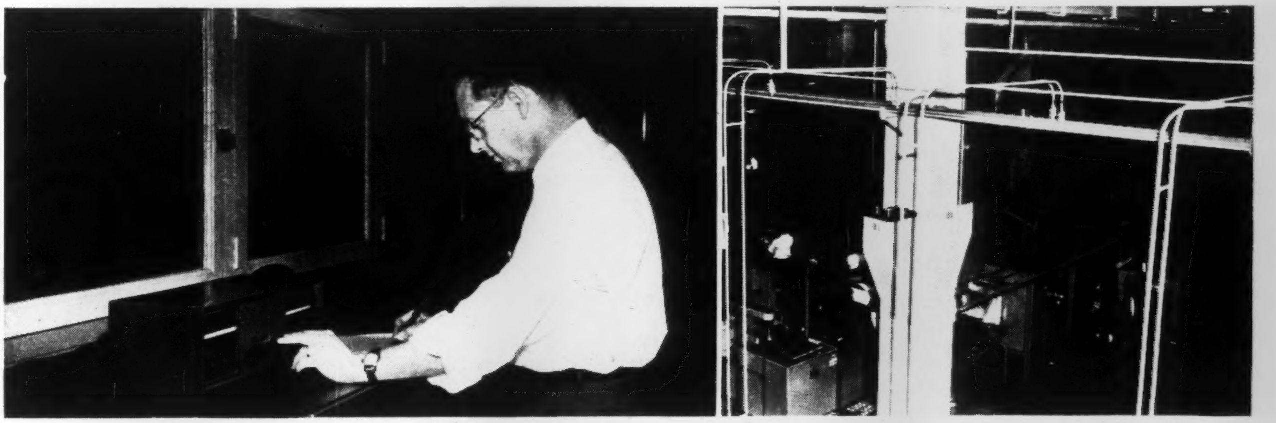
With temperature the most critical factor in any heat treating operation, The National Cash Register Company depends for the most part on L&N controllers for effective temperature control. In line with the Company's continuing program to maintain product quality and heat treating efficiency, all instruments are centralized in a control room overlooking the heat treat floor. Here an operator receives incoming work . . . schedules it for heat treat . . . sets the control point setter on the temperature controlling instrument . . . and posts on the instrument record itself the job number, time in the furnace and time due out.

To meet the requirements of their heat treat program, they've already installed 38 Speedomax® H On-Off and 2-Action Duration-Adjusting Type controllers to supplement older L&N instruments which they were using and which are still giving excellent service. These controllers are holding furnace temperatures well within the ±10 F specified . . . permit reproducible results day after day.



one of various operations performed on parts which move in and out of heat treat department on mechanized conveyors.

heat treats 900,000,000 parts a year...



and schedule on record . . . and advises furnace man when heat treat is finished. Control room overlooks heat treat floor.

nerve center of heat treat department

Heat treating operations include carburizing, hardening, tempering, annealing, sintering, brazing, etc. Furnaces are electric . . . both batch and continuous . . . and include gas carburizers, cyanide pots, salt pots, lead pots, bell annealers, draw furnaces, induction heaters, sintering furnaces, etc. Parts are made of various steels—from low carbon strip to various alloys—and in order to give the wear and service expected of a quality product, each part must—and does—meet *precise heat treating specifications.*

To keep production moving, both instruments and furnaces are routinely checked and serviced. A system of signal lights permits locating any trouble between the furnace and control room in a matter of minutes.

If you're installing new equipment or modernizing your present heat treat facilities, take advantage of L&N experience in providing control systems for thousands of heat treating applications. For more information, contact your nearest L&N office or write us at 4957 Stenton Avenue, Philadelphia 44, Pennsylvania.

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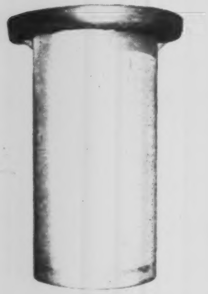
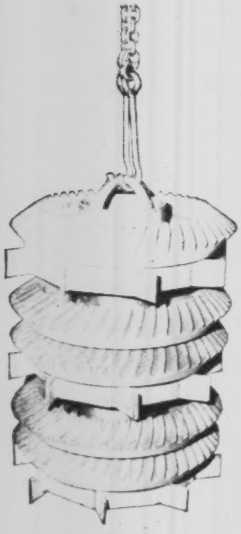


ROLOCK knows how to step up PIT-TYPE FURNACE EFFICIENCY



This BIG welded-fabricated fixture for processing heavy duty ring gears 28" in diameter is just an example of many hundreds of lift post fixtures built for use in pit-type furnaces. This fixture is held to 1670° F. for 12 hours in carburizing, then cooled to 1450° F. for 4 hours, then slowly air-cooled. It takes the place of a heavy casting.

Not only is this design relatively light in weight and hence economical in furnace time and fuel consumption, but it has proved exceptionally stable under the heavy load.

Rolock has become a major fabricator of a full range of pit-type furnace equipment adapted to the service requirements of all leading furnace makes . . . simply because Rolock designs and welded-fabrication know-how consistently reduce costs and help step up efficiency. Send us your next inquiry for recommendations and quote.

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Often a special fixture will effect tremendous savings in handling parts. Let ROLOCK experience and facilities help you enjoy these economies.

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CHARLES R. INCE
Vice President & Sales Manager
St. Joseph Lead Co., New York

Simultaneous Smelting Method To Help Lead, Zinc

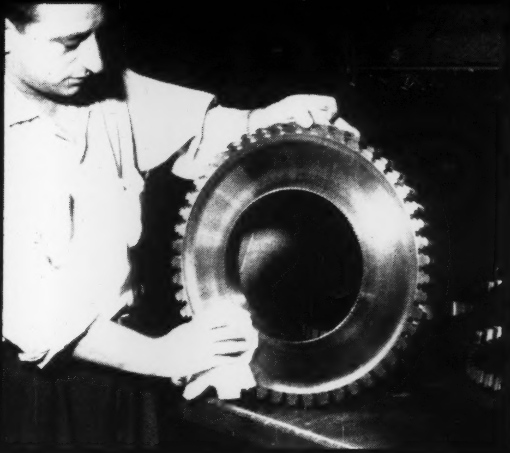
—CHARLES R. INCE

The lead and zinc market should continue to expand during the coming year although use of both declined slightly in 1957. Per capita consumption has been holding at around 15 lb for lead and 12 lb for zinc. There will be growing requirements for the metals as the population increases.

In addition, developments in the last few years have opened up what might be called "growth" applications. One example in lead is in low-firing porcelain enamels for coating aluminum and steel sheets—an outlet that will develop into major tonnage in view of the trend toward commercial construction with colored metallic exteriors.

Galvanizing and diecasting continue to be the major zinc consuming industries. Continuous lines have cut costs and greatly expanded the market for galvanized sheets. Typical growth in the zinc industry is also exemplified by the expansion in the use of zinc castings by the automotive manufacturers (68 lb per car in 1955 models, 72 lb in 1956s, and 77 lb in 1957s).

One of the outstanding developments in the extractive metallurgy of lead and zinc last year was a commercial process for the simultaneous smelting of both metals from low-grade mixed concentrates. Called the I.V.F. process (Imperial Vertical Furnace), it utilizes a blast furnace technique; the lead is recovered as a bullion and the zinc as a vapor, using molten lead as the condensing medium.



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Curtiss-Wright likes "safety and savings" of Scott Wipers!

Soft, highly absorbent Scott Wipers have been performing efficiently for 3 years throughout the Wright Aeronautical Division of Curtiss-Wright Corporation, Wood-Ridge, N.J. Fresh Scott Wipers—right out of a box at each work station—eliminate the hazards of cuts and scratches from clinging metallic chips and shavings. Disposable Scott Wipers are burned each day. And as Mr. J. Boydell, Machine Shop Foreman, says: "We keep Scott Wipers so busy, we don't really have time to keep checking the savings they effect—but we're not worried! Our experience with Scott Wipers tells us that we're getting *all* the special advantages these wipers are known to offer!" He adds that savings are "sizable."

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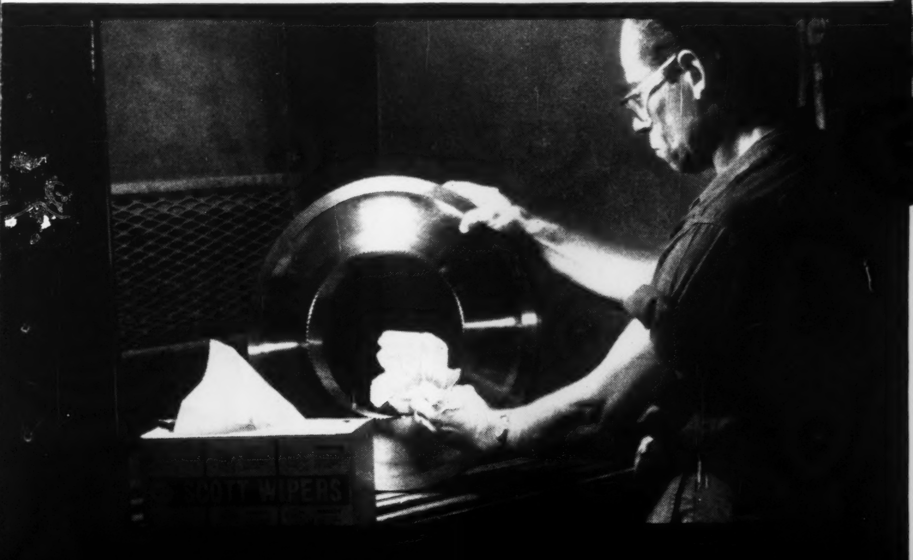
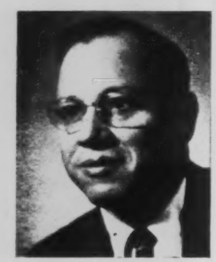
Find your Scott distributor in the Yellow Pages under "Paper Towels." He has the Curtiss-Wright case history for you, with complete facts and figures . . . and many others, covering many fields. Or write: Scott Paper Company, Dept. S-81, Chester, Pennsylvania.

SCOTT WIPERS



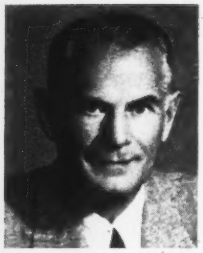
Curtiss-Wright uses Scott Wipers for wiping parts before broaching, broaching machines themselves, grinding machines, and at inspection stations. They are soft, yet tough—and their wet strength makes them ideal for wiping up oils and coolants.



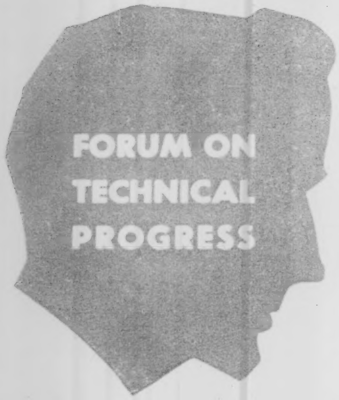
H. W. DIETERT
President, American Foundrymen's Society, Harry W. Dietert Co., Detroit

JAMES H. SMITH
General Manager, Central Foundry Div., General Motors Corp., Saginaw, Mich.

CHESTER V. NASS
Vice President & General Manager, Beardsley & Piper, division of Pettibone Mulliken Corp., Chicago



L. G. VANDERHOOF
Vice President & General Manager, Stewart Die Casting Div., Stewart-Warner Corp., Chicago



FORUM ON
TECHNICAL
PROGRESS

Casting

Many Improvements Made in Foundries

—HARRY W. DIETERT

The casting industry is advancing its marketing techniques. The American Foundrymen's Society's Training & Research Institute is teaching advanced practices concerning casting design, processes, and applications.

Automation has advanced rapidly. Excellent progress has been made in automatic molding which relieves men from heavy work.

Much attention is being given to further improvement of the foundry environment. Air pollution is being suppressed at its source. Melting units are being operated as closed systems. Air curtains are being used at shakeout and other locations.

In many instances, handling of dry molding sand has been reduced to a restricted length of the shakeout belt or conveyor. Water is added to hot, dry sand by an automatic controller, to control dust.

Molding sand consisting of hard carbon grains is being used more for production of difficult iron and bronze cast parts.

Olivine molding sand was introduced last year for casting manganese steel, iron, and aluminum parts.

Improved casting finish is being obtained from molding sand bonded with a specially treated bentonite and wetted with petroleum oil in place of water.

Fired ceramic molds are being used in increasing numbers in precision castings.

Low frequency melting furnaces offer a new tool for melting. Much study is being given to vacuum melting and pouring.

Vibrating molten metal is another metal treatment that is receiving attention.

New Inspection Methods Help Foundry Industry

—JAMES H. SMITH

A significant advance in the foundry industry during the past year has been the application of new inspection and testing mediums to production processes.

Modern foundries are using nondestructive testing for the answer to the hidden flaw problem. Methods include: Sonic testing, which uses the frequency at which a casting vibrates to measure soundness; ultrasonic echo inspection, which resembles radar and sonar in operation; and cobalt 60 radiography.

The development of those and other testing mediums has substantially advanced foundry technology and enhanced the future of the industry.

Foundries Face Challenge To Continue Improvement

—C. V. NASS

The foundry industry cannot be content with or become complacent over the progress made in the last decade in the processing, handling, and quality of its product.

Continued demands will be made on the industry for the development and expansion of our normal economy. In addition, there will be demands for materials to support the indicated crash programs in the development of intercontinental ballistic and space missiles and other weapons.

The industry will experience increased competition for the engineer-

CHARLES K. DONOHO
Chief Metallurgist, American Cast Iron Pipe Co., Birmingham

RAY H. SUTTER
President, Sutter Products Co., Holly, Mich.

J. D. ZAISER
President, Ampco Metal Inc., Milwaukee

JAMES H. LANSING
Technical & Research Director, Malleable Founders' Society, Cleveland

ing and research talent it needs because of the stepped up missile programs. But foundry equipment manufactures must, and will, continue their development of new equipment—and foundries will continue in the development of new processes.

The future prosperity of small foundries will be dependent on overcoming constantly increasing labor costs with cost-reducing mechanical processing and handling machinery and equipment.

Potential Use of Diecastings Reaches High Level

—L. G. VANDERHOOF

The potential for the usage of diecastings is probably at its highest level in the history of the industry. Technological developments in the process, resulting in improved production results and quality, present an encouraging challenge to users of components in all fields.

The industry's research foundation has made a lot of progress in the areas of controlled high production and repetitive operational procedures. Indications are the industry and its process have a bright future—one that is far beyond the wildest dreams of the few pioneer producers of the early 1900s.

Competition Improves Castings In Appearance and Tolerances

—CHARLES K. DONOHO

Shell molded gray iron castings are becoming more popular. Their production is forcing improvements in equipment and methods for conventional green sand casting.

The cupola furnace, which melts most gray iron, is being improved by hot blast, water cooling, and inwardly projecting tuyeres. With dust and fume suppressors on top of the stack, the modern cupola resembles the blast furnace more and more. Basic lined cupola melting and forehearth desulfurizing, along with controlled inoculation, allow production of higher grade irons without expensive alloying.

New applications for ductile iron continue to be developed, and the production of this metal becomes higher each year. Ductile iron is now a family of materials. New standards for high strength and alloy types have been established.

Improvement in Sand Coating Will Expand Shell Molding

—RAY SUTTER

We look forward to expanded use of shell molds and cores due to great advances in the art of coating sand with resin and the use of new precision machinery for production of shells on a cost saving, production basis.

The use of shell cores and molds allows for product improvement and a reduction of costs. Foundry managers now have a modern tool which allows them to change existing processes.

Makers of shell mold and core making machinery see a real future ahead, in which engineers, production personnel, and management can continue to progress. The progress will be made from the standpoints of cost savings quality.

The over-all impact of shell molding continues to reduce costs of foundry cleaning rooms and automated machine shops.

Better Casting Methods Benefit Brass, Bronze

—J. D. ZAISER

There is returning acceptance of the casting process as a reliable means of obtaining quality in machine parts. A decade ago, cast products lost out to forging and fabricated materials. It is possible that increased attention to quality control, improved facilities, and the adoption of new techniques have played a great part in restoring confidence in the foundryman's art.

Today, it appears that the engineer is striking a more logical balance in the selection of production methods. He is reducing costs without sacrificing the quality of products—in some cases, he is able to improve it.

The use of shell mold and carbon dioxide processes is expanding. The Shaw process is being introduced in a few shops and is said to be a superior method of making relatively large castings. It features close-to-size work without extensive tooling costs.

New Data Will Expand Uses Of Malleable Castings

—JAMES H. LANSING

Useful information on the properties of standard and pearlitic malleable iron is being developed. Elevated temperature, stress rupture, and

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G. E. SEAVOY
President, Foundry Equipment
Manufacturers Assn., Whiting Corp.,
Harvey, Ill.

creep data being accumulated should substantially expand the higher temperature application of malleables.

Long term tests are being made under the auspices of the American Society for Testing Materials on atmospheric corrosion of standard malleable, pearlitic malleables, copper-bearing malleables, steel, and nodular iron. Plates are being exposed at sites from the east to the west coast in marine, industrial, and rural atmospheres.

Seven grades of pearlitic malleable have a broad range—from ASTM Grade 45010 with 65,000 psi minimum tensile strength, 45,000 psi minimum yield strength, and 10 per cent minimum elongation, to Grade 80002 with 100,000 psi minimum tensile strength, 80,000 psi minimum yield strength, and 2 per cent minimum elongation. Pearlitic malleable can be made with tensile strengths to 135,000 psi with 2 per cent elongation.

Much interest has been shown in a high-strength malleable described by Dr. Jacques Pomey, Regie Nationale des Usines Renault, France, which has a tensile strength up to 125,000 psi and an elongation of 6 per cent.

This is a pearlitic malleable iron and a logical development of the pearlitic malleable first described by Prof. Enrique Touceda in the 1919 transactions of the American Society of Mechanical Engineers.

The ability of the small and medium size malleable foundry to make effective use of time and labor saving equipment has been demonstrated. Large production foundries are increasing their use of automatic and semiautomatic molding machines and of continuous annealing equipment.

Standard malleable castings serve well, and are preferred to many fabrications or assemblies of several small pieces. Pearlitic malleable parts provide both economy and quality in applications where their special properties can be used.

Ductile Iron Advanced By Pressure Induction

—T. E. EAGAN

Use of the CO_2 process for making molds and cores continues to be of great interest. It will increase when more is learned about air curing which uses the same or similar sodium silicate mixtures.

The air setting process is being adopted by many foundries chiefly because of improvement in core properties with less baking time. This process does not require extra facilities.

Shell molding continues to be used where practical.

Advances in gray iron metallurgy include improvement in melting and use of inoculation.

Pressure induction of magnesium to produce ductile iron was used for the first time last year. Several foundries have purchased ladles for such production. It promises to be cheaper than the use of magnesium-containing alloys. However, some foundries will not be able to use the new process until some improvement is made in the time required to hold the metal.

Although there has been a general decline in the production of all castings, use of ductile iron has increased. Further increases can be expected.

Investment Casters Spurred As Military Cuts Spending

—P. W. SCHIPPER

Since 80 per cent of investment casting capacity is devoted to military production, the reduction in defense spending has hit the industry hard. At the same time, leveling of the post-Korean war boom has taken the steam out of the commercial market.

This has jarred many management groups into taking a closer look at new processes which have been around for some time. Some of these, notably monolithic shell, will make themselves felt competitively, especially in the powerplant field where over 50 per cent of investment castings are used. Combined with stiffer competition, these new processes will bring about a new price level which should broaden the over-all market for investment castings.

The investment casting industry will do well if it can recapture in 1958 the sales lost in 1957. Relatively speaking, however, the industry will give an excellent account of itself, expanding its share of the total market.

Foundries Add Mechanization And Cupola Improvements

—G. E. SEAVOY

The price and profit squeeze which has hit all industries, and particularly the foundry industry, has forced managements to get closer to their development programs for ways to better satisfy the customer.

This is taking two routes: 1. Mechanization to reduce labor costs. 2. The adoption of new tools to make the things required by industry to meet increasing demands for higher quality products.

In the first category, material handling is becoming more recognized as a high potential source of saving. This applies particularly to overhead methods, which save floor space and utilize available space above.

Several significant trends are in the second category: Water cooled cupolas, hot blast, oxygen enriched melting and refining, the widening use of shell molding, and a pronounced increase in electric furnaces in foundries for alloy production.

In a few but important cases, serious consideration is being given to expansion programs, despite tight

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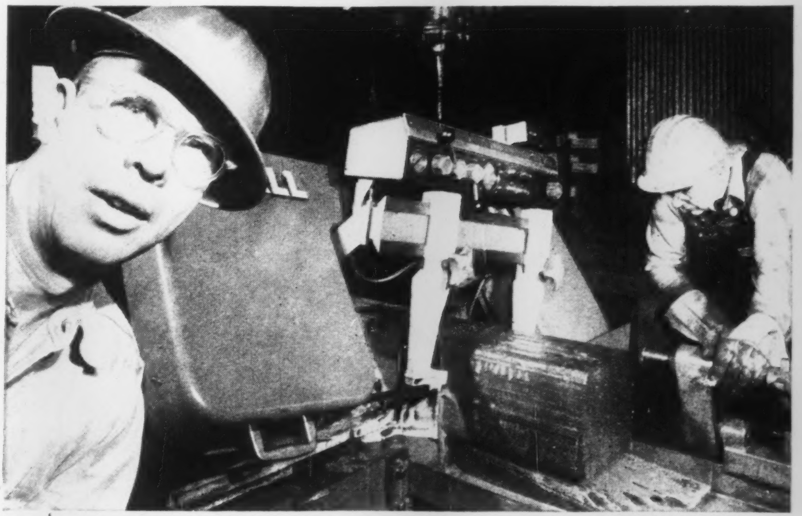

Mr. Paul Zellers (left) is Maint. Supt. of the Clifford-Jacobs Forging Co., Champaign, Ill. His cut-off department sets the pace for the company's forging operation which must turn out an unusually wide range of jobs 24 hours a day, seven days a week! This challenge to the cutting-off operations is met by two automatic DoALL Power Saws that are giving phenomenal performance: *"We increased production 200% on multiple billet cutting . . . We get up to 15,000 sq. in. blade life cutting #1040 type billets . . . 100% savings in waste metal . . . No down time for maintenance."*

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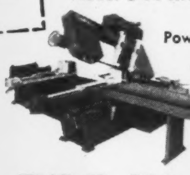

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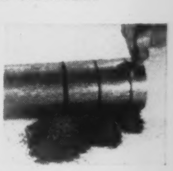

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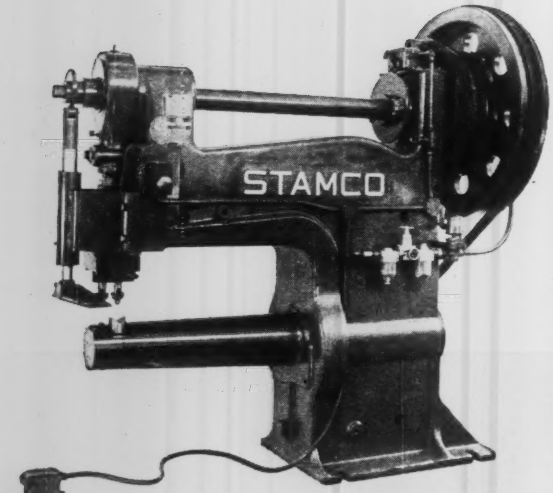
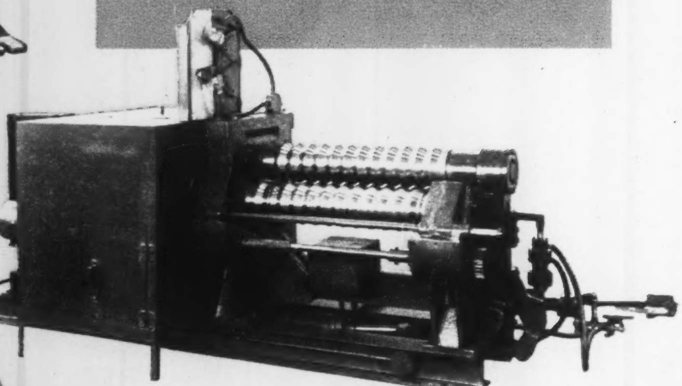
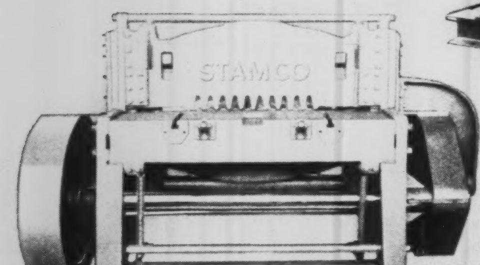


Stamco high duty culvert punch and riveter equipped with air operated friction clutch brake and cam stripper.



Stamco 8 ga. culvert curving roll with air operated endgate and motorized roll adjustment.



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markets, to increase efficiency and lower costs. The objective: A bigger slice of the competitive market.

Shell Mold Mechanization Grows in Small Foundries

—JACK E. BOLT

Shell molding has left the realm of fascinating new processes to become an accepted foundry production method. Process changes are less revolutionary than in past years, becoming more in the order of refinements.

About 10 per cent of all foundries in the U. S. and Canada use shell molding. This represents a 50 per cent increase in the last two years and a 200 per cent boost since 1953.

Foundries are rapidly switching from conventional foundry equipment that has been adapted to the shell molding process to equipment designed specifically for shell molding.

We should see increased activity in shell mold blowing machines, sand reclamation units, and equipment for the resin coating of heated sands. Applications should spread from the large into small and medium sized shops, particularly where used sand disposal is a problem. With heated sand available from a reclamation unit, the "hot" process for resin coating becomes most attractive.

Major development work in shell molding is expected to be on resin-coated sand. In addition to hot coating, refinements should continue with both "warm" and "cold" sands using both liquid and dry resins. The objectives will be to utilize noncombustible solvents and to increase bonding efficiency of the resins.

Development work will continue in the area of low carbon steel castings. The use of molding media other than silica, such as zircon sand, and forsterite, should expand for this and other special applications.

With the growing use of shell cores in magnesium and aluminum diecastings, development effort is being directed toward increasing collapsibility.

The use of shell cores with the other casting processes should continue to increase.

Sees Closer Tolerances For Aluminum Castings

—DONALD L. COLWELL

There are two trends toward more and better aluminum castings.

1. First is the desire for 100 per cent dependable castings whose mechanical properties equal those of separately cast test bars. Considerable progress has been made possible by improvements in foundry techniques, particularly in sand and permanent mold castings; by pattern equipment of greater accuracy; by alloys with superior properties; and by control of casting processes. Some foundries are having pattern equipment made by toolmakers; some are having their flasks accurately fitted.

High strength alloys, such as the self-aging type in the AG series and GM 70B of the ASTM, are being used more. Both eliminate heat treatment and achieve greater accuracy and lower costs. Aluminum silicon alloys with iron contents below 0.2 per cent are used where heat treatment develops full yield strengths without unnecessary loss of elongation, as in the usual 355 and 356 types.

One of the new alloys contains 0.25 per cent beryllium.

2. The other trend is the wider use of the metal mold casting processes, particularly diecasting—and to a lesser extent, permanent mold.

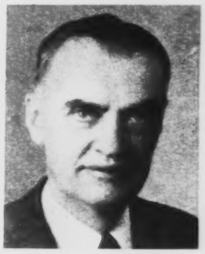
The trend toward diecastings is emphasized in the case of aluminum. It meets the consumer's demand for portability and industry's search for a way to combat steadily increasing freight rates.

The trend to automation will see increasing use of aluminum diecasting because of its short distance from molten metal to finished part.

Diecasting takes about 50 per cent of all aluminum put into castings; the American Foundrymen's Society has recognized this by setting up a "Die Casting & Permanent Mold Division."

There is a demand for aluminum diecastings which can be anodized, and at least one such alloy is in pilot plant production. The vacuum process is also being applied to aluminum diecastings; its proponents claim that even silicon alloys cast under vacuum can be anodized with light colors.

JACK E. BOLT
Chemical & Metallurgical Div., General Electric Co., Pittsfield, Mass.



D. L. COLWELL
Vice President, Apex Smelting Co., Cleveland

CHARLES W. BRIGGS
Technical & Research Director, Steel Founders' Society of America, Cleveland

Steel Casting Quality Upped by Developments

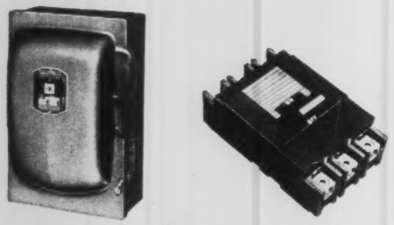
—CHARLES W. BRIGGS

Quality steel castings can best be produced by the use of raw materials which meet definite requirements. For that reason, the Steel Founders' Society has issued raw material specifications on western bentonite, gelatinized cereal binder, zircon sand and flour.

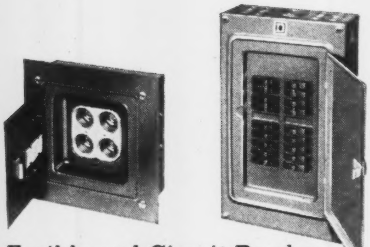
A test new to the foundry industry, the liquid limit method, defines the quality of bentonite. It determines the plasticity of the clay. Research, correlating studies of bentonites of high and low liquid limits, has shown that mold erosion and scabbing are the result of low liquid limit bentonites.

Before, tests of bentonite were made when it was mixed with sand. Results were so erratic that purchase specifications could not be prepared.

The steel founders are interested in the possibilities of the carbon rod resistor furnace and its use in place of the high frequency induction furnace. It offers lower initial cost, and

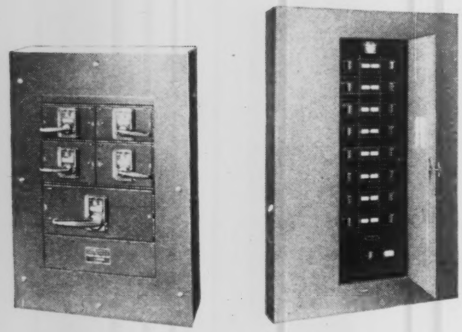


- Safety Switches and Industrial Circuit Breakers

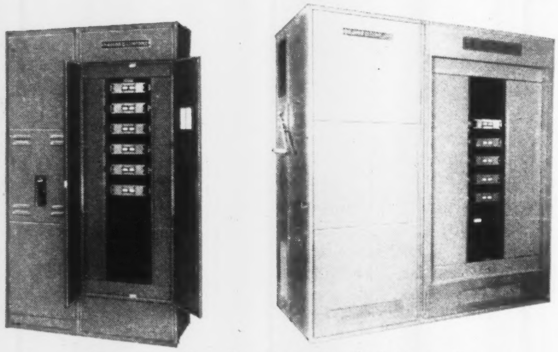


- Fusible and Circuit Breaker Load Centers

- Voltage Testers



- Fusible and Circuit Breaker Lighting and Power Panelboards



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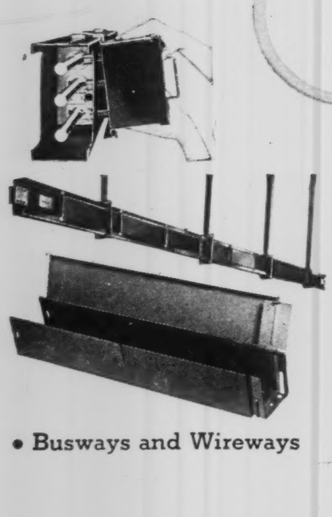
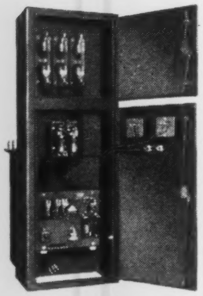


- Busways and Wireways



EC&M
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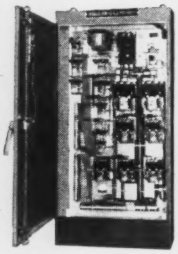
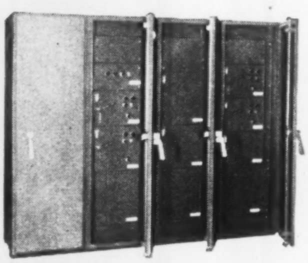
Synchronous Starters

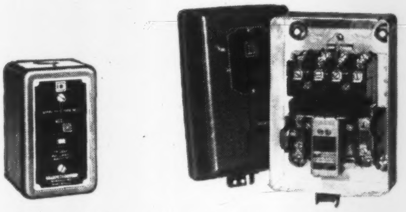


- Special Purpose Control

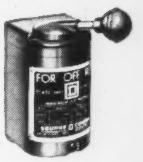


- Control Centers

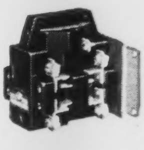
SQUARE D COMPANY



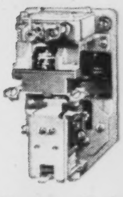
- A.C. Manual and Magnetic Starters



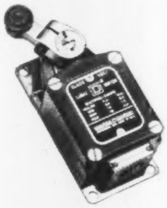
- Drum Switches



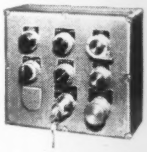
- Control Relays



- Timing Relays



- Limit Switches



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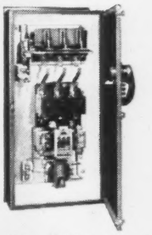
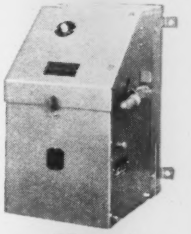
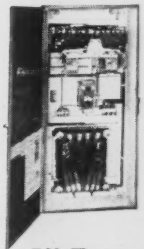


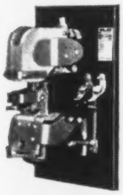
- Combination Starters



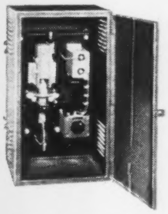
- Manual Compensators



- All Types of Reduced Voltage Starters



- D.C. Starters



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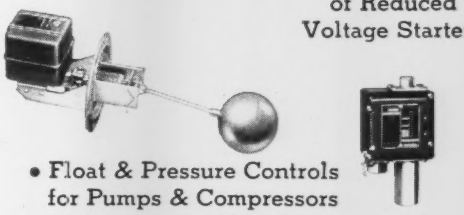

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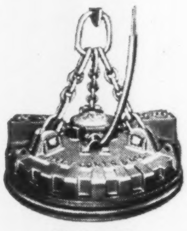

EC&M
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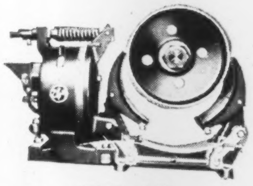

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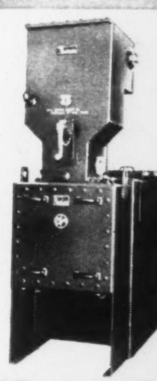
Magnetic Brakes



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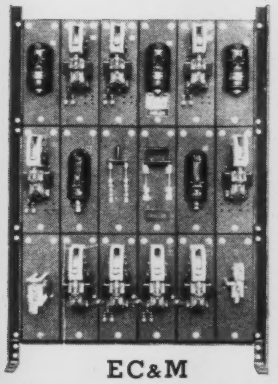

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DESIGN LEADERSHIP FOR MORE THAN 50 YEARS it is more than a melting furnace (it is adaptable to slag control).

There is growing interest in the application of efficiency measurements to operations—setting standards through menomotion studies, establishing grinding work standards with workometers, establishing welding incentives through time studies, improving arc air efficiency, and the application of incentive systems for molding operations.

Particular interest is shown in new methods using complex deoxidizers to produce high-quality steel castings.

CHARLES F. WALTON
Technical Director, Gray Iron Founders' Society Inc., Cleveland

EINAR A. BORCH
Vice President, National Metal Abrasive Co., Cleveland

F. B. ROTE
Technical Director, Albion Malleable Iron Co., Albion, Mich.

Gray Iron Foundries Make Rapid Progress

—CHARLES F. WALTON

The iron foundry industry has advanced more technically in the last ten years than it did in the preceding quarter century. This rate of progress will certainly continue. We have not fully utilized the fundamentals of physics, chemistry, and metallurgy.

Ductile (nodular) iron has been out of the laboratory less than ten years, but it has developed into a widely used material. Its present production rate is about 150,000 tons annually, and its indicated growth rate (1.6 times per year) is expected to continue.

Production of iron castings has increased, while the number of foundries has decreased. The typical foundry organization is becoming larger and capable of supporting an engineering staff that can apply technological advances. The industry expects to increase its engineering staff by 30 per cent in the next three years.

With such rapid progress, it is not surprising that full use of economic and technical advantages is not being made. Action is being taken by the industry to overcome the gap. Progressive iron foundries are co-operating with their trade association, the Gray Iron Founders' Society, in conducting technical training clinics for their salesmen.

Technical developments in the casting processes are expected to continue.

Equipment Maker Has Role In Expanding Foundry Sales

—E. A. BORCH

The alert equipment manufacturer realizes that industry must do several things to expand its markets. It must improve casting techniques, develop new processes leading to new products, and be able to offer better values to buyers by operating at top efficiency. But the equipment manufacturer sees two factors that dampen hope for the immediate future:

1. So far in this decade, foundry equipment makers have had three order booms—in 1950, 1953, and 1956. Expansion has been the predominant factor motivating purchases. Foundries, generally, now have more than enough capacity to meet needs of the future on a short range basis.

2. An adjustment has been underway in the foundry industry for some months and doubtless will continue into early 1958. It has reduced profits, one source of funds for capital investment. Coupled with that, the foundry industry has a cautious short term outlook.

Optimism for the equipment maker stems from the foundry industry's new marketing concept and what it portends in the way of requirements for newly designed equipment to produce new products.

Selling more castings is not a job for the foundry industry alone. The equipment manufacturer can, and will, contribute greatly to the success of the effort. Full co-operation of the foundry operator is a prerequisite—he must let the equipment manufacturer know what is needed to produce the new castings that will expand the foundry market.

Pearlitic Malleable Trend Is Toward Higher Strength

—F. B. ROTE

Increasing use of pearlitic malleable continues but is undergoing a change in emphasis. During the last three years, production foundries have installed hardening facilities which permit design engineers to specify mass produced, higher strength pearlitic malleable. The production of the hardened and drawn material increased markedly during 1957 and promises to make further inroads. Some foundries produce as much as 65 per cent of their pearlitic malleable by oil quench and draw.

Traditional straightening methods used with standard malleable iron are frequently unsatisfactory for pearlitic grades because of their higher strength and greater springback. The situation has led to the development of hot pressing techniques which permit closer adherence to print dimensions because the pressing operation is done at temperature ranges in which the material is highly plastic. Hot pressing will undoubtedly grow as demand for closer tolerances increases.

Several malleable foundries have installed mechanized shell molding and shell core facilities, largely for the production growth of pearlitic malleable. The growth will continue as the malleable industry is called on to provide more mass produced castings for highly automated machining lines.

The use of CO_2 cores and molds is

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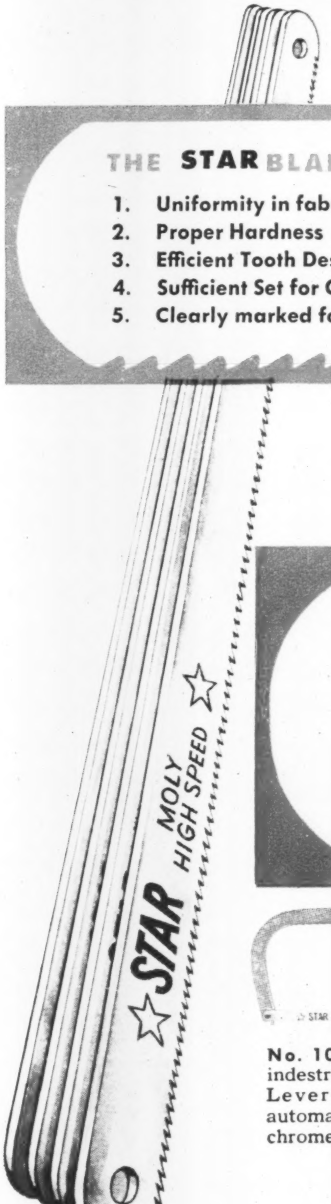

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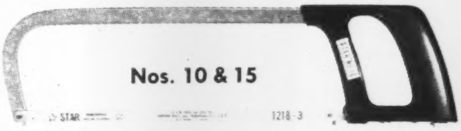

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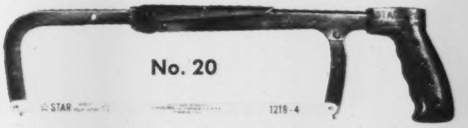

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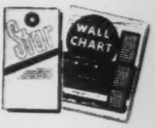

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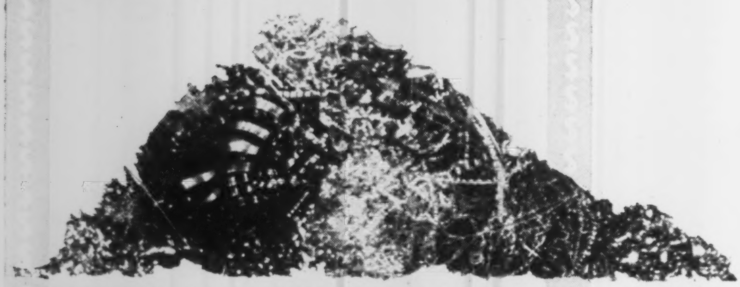

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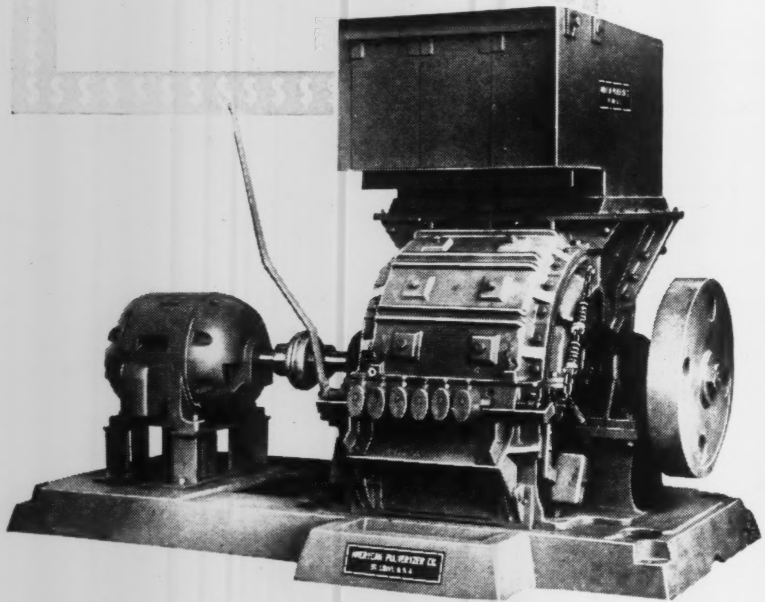

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E. J. METZGER
President, Multi-Cast Corp.,
Wauseon, Ohio

on the increase. Improvements in practices permit better control in manufacture and in the shakeout characteristics of the CO_2 bonded sands. The trend will continue because the use of CO_2 sand, particularly in cores, permits savings of time and money in tooling.

Intense activity in the development of improved metals of malleable base composition promises to yield real advantages to users of malleable and pearlitic malleable. One higher strength material is in commercial production; others are nearing the production stage.

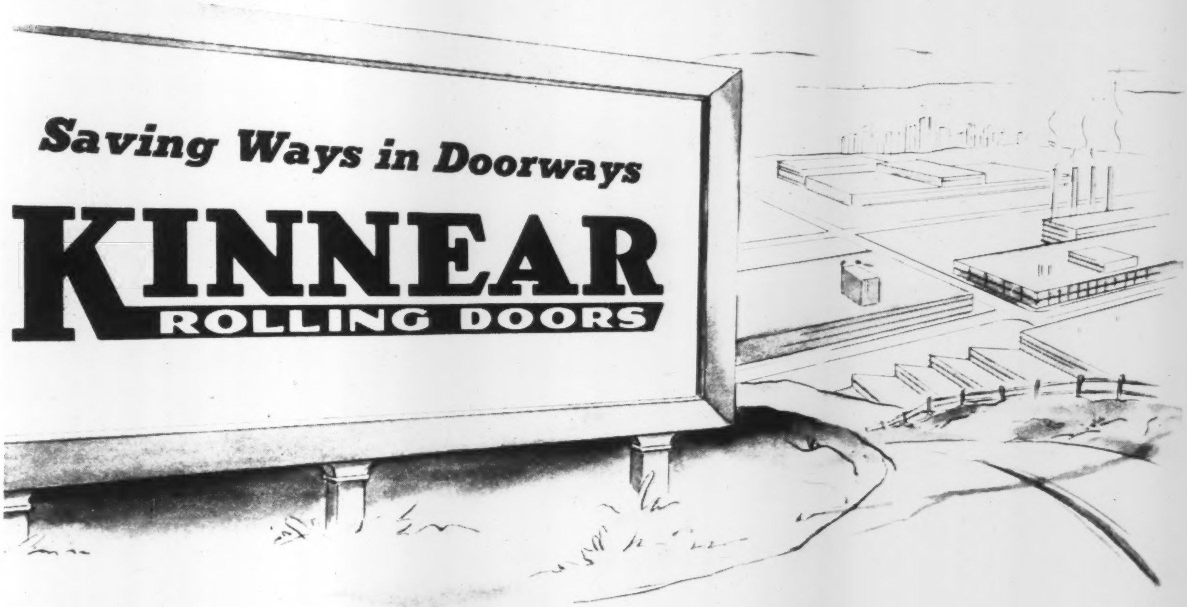
Small Foundries Can Compete By Using New Equipment

—E. J. METZGER

Labor saving equipment suitable for any degree of mechanization is available to the small foundry. It must be used to every possible advantage within a framework of flexibility suitable to the type of production used. If small jobbing lots are produced from an assortment of loose patterns, an overhead sand system with all the trimmings is not needed. But labor costs can be saved with lift trucks, conveying devices, blasting units, sand preparation machines, and other types of equipment.

There is a movement toward specialization in the small foundry. Processes available include plastic bonded shell molds and cores made on accurate and specialized equipment and sodium silicate binders which eliminate baking of molds and cores and reduce equipment expense to the customer at no sacrifice of quality. We also have new nonfer-

(*Please turn to Page* 266)



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Wherever you see Kinnear Rolling Doors, you can be sure there's a high level of efficiency in handling plant traffic—plus other important advantages.

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Kinnear Motor Operators add quick, easy, push-button control to this efficiency. They permit you to control any number of doors from a single point, or each door from any number of points.

This cuts traffic delays and bottlenecks and promotes *prompt* door closure, reducing loss of heated air in winter, cooled air in summer.

In addition, Kinnear Rolling Doors assure extra all-steel protection against wind, weather, fire, intrusion and vandalism.

You can't beat Kinnear's 60-year record for providing long, low-cost, dependable door service under hardest daily use. Kinnear Rolling Doors—built to fit any opening—are easily installed in old or new buildings. Write today for catalog or recommendations.

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Heavily Galvanized! 1.25 oz. of pure zinc per sq. ft. of metal (ASTM Standards) gives Kinnear Rolling Doors **lasting** protection from the elements. Special Kinnear Paint Bond permits paint to be applied immediately after doors are erected, assuring thorough coverage and lasting adhesion.

Saving Ways in Doorways
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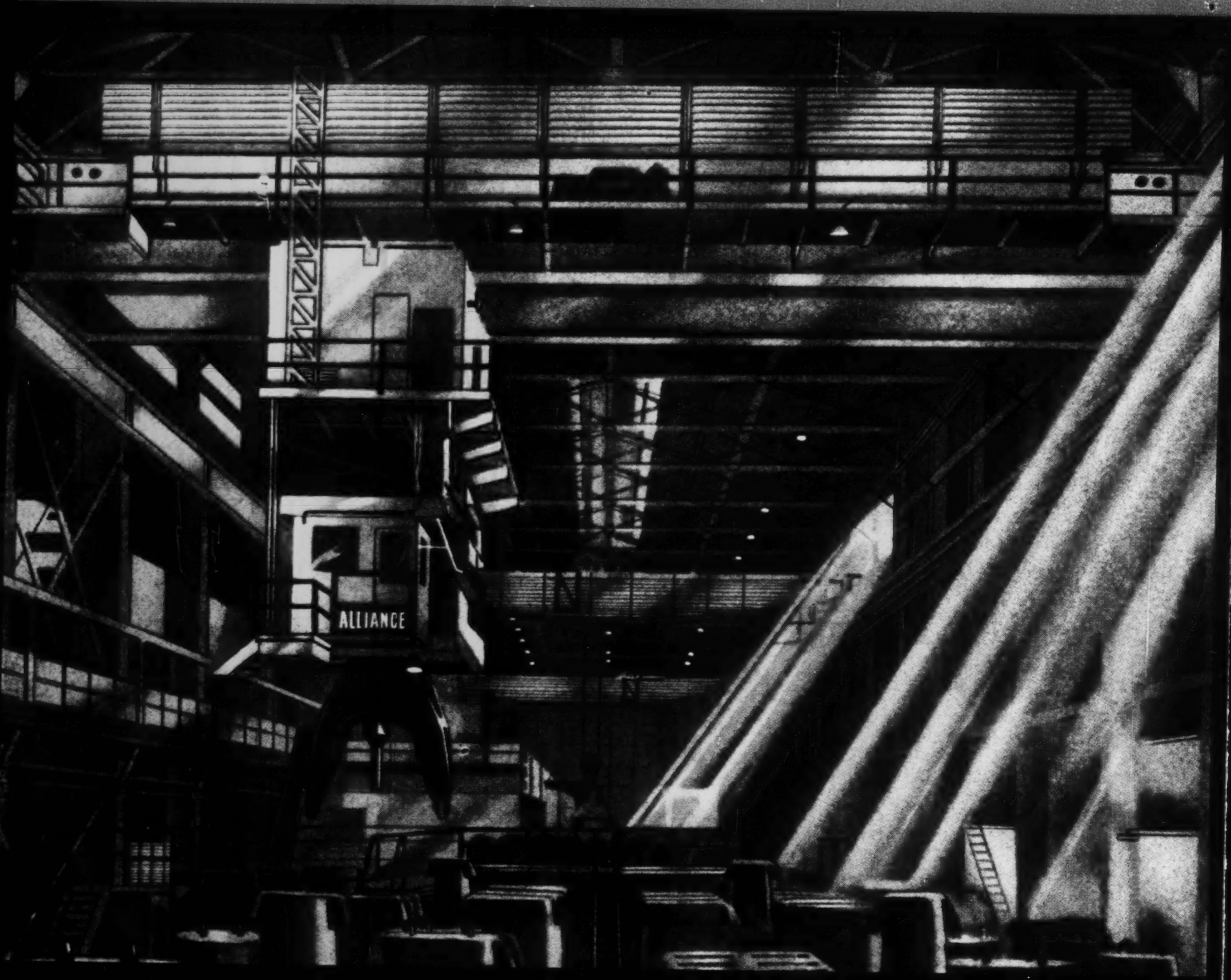
ROLLING DOORS

HYDRAULIC INGOT STRIPPER



Patent Pending

"Give us the Runway and we'll lift the World"

● This 450-ton *hydraulic* ingot stripper is arranged for 360° revolving of the tongs to twist off the sprue of bottom poured ingots. Tongs are power operated and equipped with bits, so that in addition to stripping ingots, they also handle ingots, slabs or moulds for storage. Alliance engineers will work with you on any heavy materials handling problem. Consult them. They'll develop an efficient, economical solution for you.

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ALLIANCE
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... it's new and versatile

Tong's range:
To suit your moulds
and ingots

Stripping mould

Alliance

Handling ingot

Handling ingot

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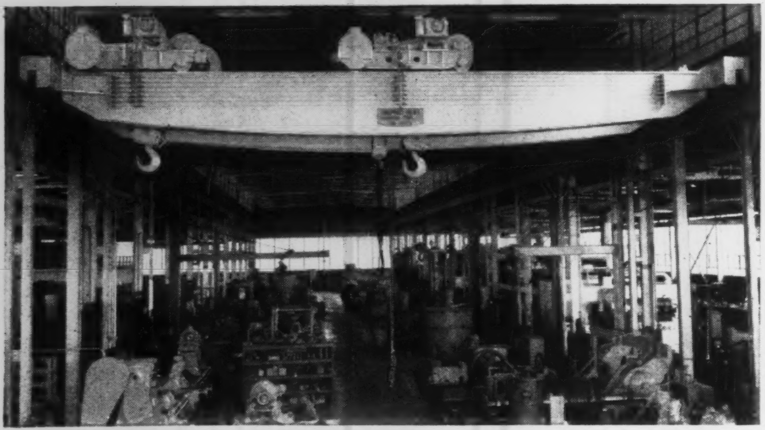
1 to 450 TONS



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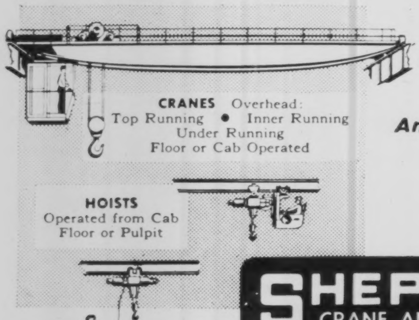
Shepard offers a complete line of heavy industrial cranes . . . from 1 to 450 tons . . . for light, medium or heavy service. Available for constant or intermittent duty in slow, medium and high speeds; operated from cab or floor. Let a Shepard Niles representative help you select the crane that best fits your plant's load-handling requirements.



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DAVID LAINE
Secretary, American Die Casting Institute Inc., New York

rous alloys. Some depend upon high purity compositions which require great care in handling and the most modern melting equipment, such as vacuum melting.

More of our customers are demanding castings engineered to meet requirements of lighter weight, increased strength, greater machinability, more heat resistance, higher conductivity, or better appearance. They are all possible in the modern small foundry today.

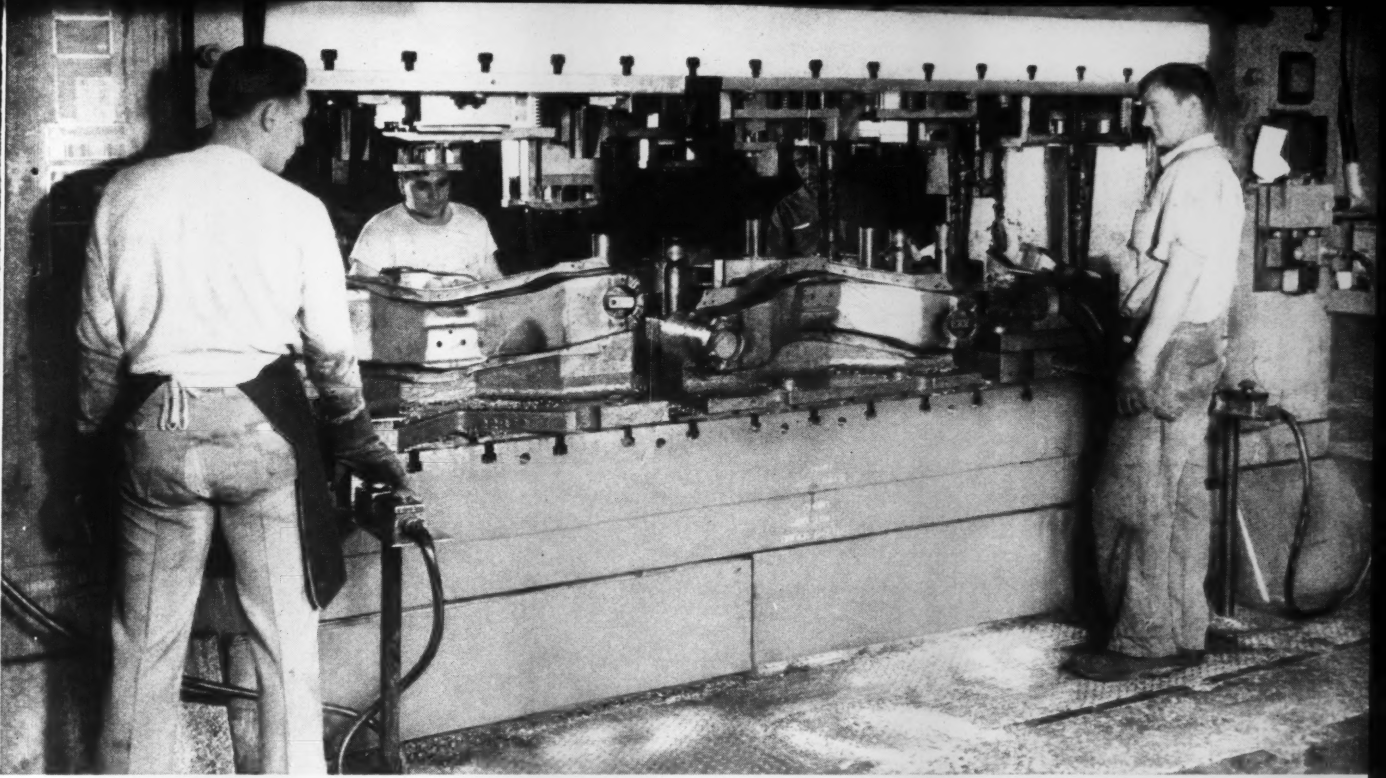
Predicts Record Demand For Diecasting Industry

—DAVID LAINE

It appears that the job shop diecasting industry is on the threshold of a period that will surpass peak 1955.

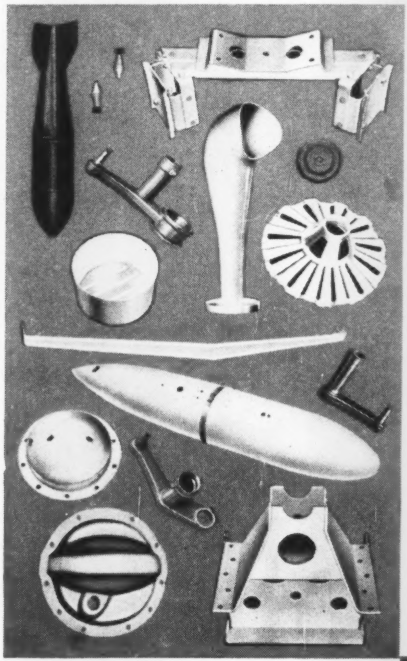
While future demands will be for all metals, aluminum will probably make the greatest gains. Production data for 1957 indicate an all-time high for aluminum diecastings (380 million lb). Job shops accounted for a new high of 273 million lb of the output.

Zinc diecasting production in 1957, while still below 1955's peak, showed some improvement over 1956. Output for 1957 is indicated at 370,000 tons—of which custom diecasters produced 240,000 tons. The widespread use of zinc diecastings in styling the 1958 cars, including the Edsel, plus the increased use of diecast components for home appliances and business machines, should mean a healthy boost in 1958. The predictions assume that the home appliance field will show considerable improvement in 1958 and that optimistic production forecasts for autos and business machines are upheld.



Parts are rotated through seven-stage perforating operation on this press. Multi-stage operations reduce handling with resultant increased production and cost savings.

Making your money buy more pressed metal parts



When you contract for pressed metal parts from Parish, you're getting far more than just the use of presses and press-operators. You also get the benefits of a highly experienced and resourceful staff of Parish production engineers — who can reduce the number of operations needed to produce your part in almost every case.

You get more parts, quicker. Your costs are whittled to a minimum.

Any pressed metal part problem that ultra-modern machines and creative engineering can solve, can be solved by Parish. For information and production quotations, get in touch with Parish today. Be sure to ask for our new booklet on precision production facilities.

◀ They're all Parish products. Large parts, and small ones, steel or nonferrous metals, Parish has the experience and facilities.

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G. W. TRICHEL
President, Amplex Div.,
Chrysler Corp., Detroit

J. H. BECHTOLD
Manager, Metallurgy Dept.,
Westinghouse Electric Corp.,
Pittsburgh

W. B. PIERCE
Vice President, Allegheny Ludlum
Steel Corp., Pittsburgh

T. G. FOULKES
Metallurgical Engineer, Bethlehem
Steel Co., Bethlehem, Pa.

FORUM ON
TECHNICAL
PROGRESS

Materials and Metallurgy

More Powder Parts Will Be Used in '58

—G. W. TRICHEL

We believe 1958 will see growing use of the powder metallurgy process to produce functional metal parts. Competitive pressures will tend to accelerate the trend because the process offers considerable opportunity for economies in production.

Bearings will continue to be a major portion of the business. Some improvement can be expected in their performance, and we expect a trend to produce bearings from powders less expensive than copper-base compositions.

Most expansion will be in iron base compositions. The availability of new type powders, including some alloys not previously available, will help. An increase in the use of stainless steel powder parts is expected.

Cube Oriented Silicon Iron Moves Toward Production

—J. H. BECHTOLD

The big metallurgical news in the electrical industry last year was the announcement of cube oriented silicon iron. The goal of many years of laboratory research, the electrical sheet has two easy directions of magnetization, contrasted with the older grain oriented Hipersil sheet which has one easy direction of magnetization.

During 1958 there will be increased effort on pilot plant and commercial production of the material.

Electron bombardment will receive increased attention in metallurgical research as a heat source for vacuum melting and heat treating. Initial results indicate it to be a potent tool for obtaining highly concentrated heat sources under high vacuum conditions in producing gas-free metal.

Supply of Vacuum Alloys Continues To Grow

—W. B. PIERCE

Vacuum melted steels and superalloys made major gains in 1957; more growth is expected this year. It is estimated that the industry has facilities to produce about 50 million lb annually by consumable electrode vacuum melting and about 20 million lb by induction vacuum melting.

The consumable electrode process (which owes much of its progress to titanium processing) is showing the most rapid growth. Expansion in progress or planned should double consumable electrode capacity by the end of 1958. Induction vacuum capacity is expected to increase by about 35 per cent.

The trend is toward larger equipment which produces larger ingots. Last year we brought in a consumable electrode furnace which makes ingots 26 in. in diameter, weighing up to 12,000 lb. Major consumers of the vacuum melted alloys are the aircraft and missilemakers and producers of bearings, gas, and steam turbines.

Less Notch Sensitive Steels Are Being Sought

—T. G. FOULKES

Notch sensitivity will receive increased attention in steel metallurgy in 1958. It now occupies an important place in research; interest is rapidly growing. The welded ship failures of World War II focused attention on

FRANK B. RACKLEY
President, Jessop Steel Co.,
Washington, Pa.

J. H. HOLLOMON
Manager, Metallurgy & Ceramics
Research Dept., General Electric Co.,
Schenectady, N. Y.

M. N. ORNITZ
Vice President-General Manager,
National Alloy Div., Blaw Knox Co.,
Pittsburgh

F. L. LaQUE
Vice President, International Nickel
Co. Inc., New York

notch sensitivity in ship plates. It's now receiving consideration on larger masses, such as heavy forgings for power equipment and atomic energy applications.

Brittle fractures in large forgings made of notch sensitive steels under conditions favoring such failures have prompted an extensive search for better steel compositions. Work is being done on production size forgings and laboratory melts. In laboratory studies, numerous gradations of composition can be evaluated. Production forgings of the most promising compositions can be given full scale evaluation.

The larger masses introduce additional problems. One is obtaining the cooling rate necessary for the most desirable microstructure. It is not possible to obtain high cooling rates at deep seated areas in large forgings. A balance between enriched compositions, with attendant processing hazards, and the desired microstructure is inevitable.

Aircraft Alloy Steels Have Premium Properties

—FRANK B. RACKLEY

Our jet age is imposing more stringent demands on the critical applications of alloy steels for vital aircraft components. Uncompromising quality and utmost mechanical properties are being specified to increase strength-to-weight ratios for supremacy of performance.

Our Macro-Clean steels have unmatched forging qualities and grain structures in sections up to 14 in. square, which make them especially suitable for aircraft applications. Our 4340 grade consistently meets a transverse tensile of 260,000 to 280,000 psi, with a reduction in area of 13 per cent or better. The results are achieved through the use of new arc-type electric furnaces and the Dornin process at our recently acquired Green River Steel Co., Owensboro, Ky.

Landing gear and other critical aircraft assemblies which must withstand the impact of extreme shock loads at high and low temperatures have been fabricated from Macro-Clean billets, bars, and slabs.

Missiles Will Change Goals For Materials Research

—J. H. HOLLOMON

The increasing importance of missiles will change the emphasis on much material research in the near future.

With the change from subsonic to supersonic aircraft speeds, high temperature materials for engine applications become less important. The primary burning of fuel takes place in the afterburner of the engine rather than in the engine. So it's not so important that the turbine blades and the nozzles of the engines be at high temperatures as is the case with subsonic aircraft.

The problem of missiles and rockets largely becomes one of re-entry protection. Intercontinental ballistic missiles and manned satellites will have to re-enter (at least under some conditions) at relatively rapid speeds. What is needed is a material of high heat capacity or one which absorbs a great deal of heat in undergoing some chemical reaction such as evaporation.

It means the emphasis may change from materials with high strength at high temperatures (such as the refractory metals) to materials with a higher heat absorption and minimum weight.

The problem of the airframe will continue to be associated with materials of high strength at elevated temperature and low density, or materials that resist buckling at high temperatures.

High Temperature Alloys Must Be Versatile

—MARTIN N. ORNITZ

Of immediate concern is the need for high temperature alloys which will satisfy such problems as:

1. Stress rupture life of 100 hours, with stresses of 10,000 psi at 2000° F. 2. Surface stability in atmospheres which contain, in addition to normal fuel gases and products of combustion, such compounds as vanadium pentoxide, boron, and sodium. 3. Corrosion resistance to liquid metals and salts. 4. Resistance to high velocity gases. 5. Practical engineering strength for temperatures over 2300° F. 6. Ability to resist temperatures in the neighborhood of 4000° F for relatively short periods (seconds). 7. Ability to resist pickup in continuous heat treating furnaces.

Users Want Properties That Match Their Needs

—FRANK L. LaQUE

Users of materials are becoming more specific in their requirements of special properties. Their requests call for a better understanding of composition, structure, and even

K. D. MANN
President, Firth Sterling Inc., Pittsburgh

KEMPTON H. ROLL
Executive Secretary, Metal Powder Assn., New York

JOHN R. WILLARD
Sales Engineering & Development Div., Aluminum Co. of America, New Kensington, Pa.

C. L. HARDY
President, Jos. T. Ryerson & Son Inc., Chicago

atomic arrangements of materials.

To get such information, improved instruments and techniques for examining materials are being used. We are becoming more concerned with the finer details of structure and composition, including elements present in trace amounts which are disclosed by the electron microscope; we're also using improved methods of analysis which are based on physics rather than chemistry.

We are learning more about what makes alloys strong or weak, tough or brittle. Users need such information as they extend their demands on strength, corrosion resistance, and ability to withstand the rigors of services involving the high temperatures, high pressures, and rates of loading that are becoming increasingly difficult to deal with.

As both users and producers increase their precise knowledge of properties, the matching of them to needs is easier.

Need for New Materials Is Metallurgy's Challenge

—K. D. MANN

Emphasis on the development of intercontinental missiles challenges the resourcefulness of metallurgical industries. Many problems of suitable material remain unsolved. Complex metallic compounds show promise of solving some of the most critical problems relating to nose cones and materials for high temperature guidance systems.

Metallurgical laboratories are developing more efficient materials for nuclear reactors, structural members, control rods, survey devices, shielding, and moderators.

As a result of problems arising in the development of materials, new industries are being developed and expanded into major enterprises almost overnight. The present rate of increase in metallurgical knowledge has outstripped that of any similar period in history.

Improved Powder Presses Open Up New Vistas

—KEMPTON H. ROLL

Metal powders are being made with closer control over quality and uniformity and have improved pressing and sintering characteristics. Press manufacturers are developing higher capacity equipment which is able to turn out bigger parts; presses have close control over movements and are capable of multiple action, including side pressing. It's possible to press and eject metal powder compacts which couldn't be handled a few years ago.

Extensive development work is being carried out by builders of sintering furnaces. Pressmakers and furnace builders have established technical committees under the sponsorship of the Metal Powder Association for the purpose of improving their products for the benefit of fabricators.

Sees Aluminum Uses Expanding In Many Market Areas

—JOHN R. WILLARD

Automobile makers are increasing their use of aluminum each year—chiefly in pistons, automatic transmission components, and other functional parts. Aluminum trim in colored and natural finishes is coming into more widespread use. Designers are responding to demand for color by taking advantage of a unique quality: The ability of aluminum to impart color to its oxide coating.

Usage is increasing in residential construction. Window production continues to set records year after year. Aluminum clapboard siding increased 11 per cent during the past year. The average new home has about 30 lb of aluminum in its construction. We are convinced that the figure will grow to at least 1000 lb.

Nonresidential construction should continue its steady pace in 1958. Curtain walls, roofing, window frames, doors, and hardware applications will help to sustain the growth in this area.

State highway engineers are recognizing the maintenance-free advantages of aluminum railings, lighting standards, signs, and chain link fence. Consumption should increase by about 18 per cent in 1958.

With such markets increasing and new uses developing, there is little doubt that the growth of consumption ahead will be at a much faster rate than the growth of the economy as a whole.

More Service for Users, Aim of Warehousing Industry

—C. L. HARDY

A significant trend in the steel warehousing industry is the increased demand from customers for what is called "first operation" material. Nowhere is this more apparent than in flat-rolled steel which adequately equipped steel service centers now supply in blanks, straightened and cut-to-length strip, and slit coils.

There is a growing belief that taking steel from truck tailboard direct-

Choice of the Leaders

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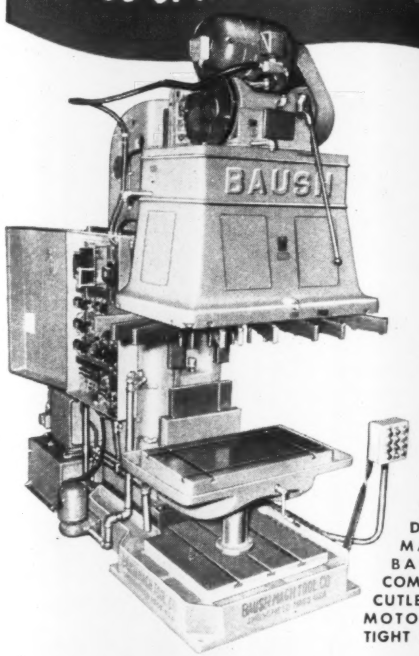

THE SEYBOLD 100" FULL-HYDRAULIC MILL SPACER TRIMMER MANUFACTURED BY THE HARRIS-SEYBOLD COMPANY IS EQUIPPED WITH CUTLER-HAMMER THREE-STAR MOTOR CONTROL AS ORIGINAL CONTROL EQUIPMENT.

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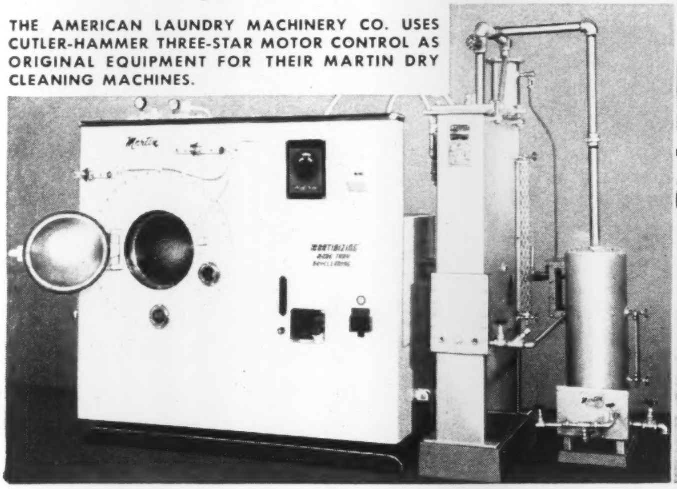
THE AMERICAN LAUNDRY MACHINERY CO. USES CUTLER-HAMMER THREE-STAR MOTOR CONTROL AS ORIGINAL EQUIPMENT FOR THEIR MARTIN DRY CLEANING MACHINES.



THIS REX SLUDGE COLLECTOR BUILT BY THE CHAIN BELT COMPANY IS SUPPLIED WITH CUTLER-HAMMER MOTOR CONTROL.

Look to the Stars for Satisfaction

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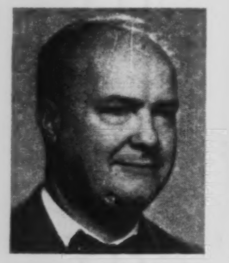
When you buy machinery, note how often Cutler-Hammer Three-Star Motor Control is not only offered but featured by leading machinery builders. Look to the Stars for satisfaction. CUTLER-HAMMER Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate*: Canadian Cutler-Hammer, Ltd., Toronto.



CHARLES E. NELSON
Technical Director, Magnesium Dept.,
Dow Chemical Co., Midland, Mich.

J. S. RODGERS
Technical Manager, Wolverine Tube
Div., Calumet & Hecla Inc., Detroit

EDMUND M. VELTEN
Technical Director, Beryllium Corp.,
Reading, Pa.

JOHN C. HAMAKER JR.
Manager of Research, Vanadium-
Alloys Steel Co., Latrobe, Pa.

ly to the blanking, stamping, or other processing equipment is the most economical way of using it. The up-to-date steel service center is meeting this challenge with its large stocks, modern automatic shearing and slitting equipment, combined with quick, dependable service.

Recent studies have indicated substantial reductions in cost based on elimination of scrap, fewer dollars tied up in inventory, elimination of obsolete material, lowered handling costs, and more space available for productive purposes.

Stronger Magnesium Alloys Move into Picture

—C. E. NELSON

Several magnesium developments underway for many years jelled during 1957. Here are a few:

Four new grades of higher purity, electrolytic magnesium were developed to meet specific needs of the metallurgical industry. They are intended for use in reducing titanium, zirconium, beryllium, and uranium.

A magnesium-zinc-rare earth wrought alloy has been developed which obviates stress relieving after welding. A new casting alloy offers extremely high damping capacity and should find use in airborne electronic equipment and missile guidance systems.

Heat treating and aging to the T6 condition has been adapted to ZK60 forgings with these results: Tensile yield strength is hiked by as much as 40 per cent, ultimate tensile strength by about 10 per cent, and resistance to creep at 300° F by almost 400 per cent.

Magnesium-thorium extrusions found their first commercial use as control surfaces for the Bomarc missile. Rapid progress was made in forging billets extruded from the same alloy. Extrusion of atomized magnesium pellets yields the strongest room temperature alloys now known.

Nonferrous Tubing Lengths Will Go to 3000 Ft

—J. S. RODGERS

Users of nonferrous tubing are demanding longer lengths. Only recently, it was shipped in 50 to 100 ft lengths; in 1958, 2000 to 3000 ft coils will not be uncommon.

Availability of longer lengths makes it possible to install radiant heating coils without locating joints behind walls or beneath floors. In the case of refrigerating and air conditioning equipment, long lengths are needed to fully utilize automated lines.

To meet this demand, tube mills will have to modernize facilities. One has recently installed a three strand tube reducer of new design and 60 in. diameter bull blocks to replace conventional draw benches.

Because of its unique nuclear properties, zirconium is receiving increased attention from fabricators. Zircaloy tubing will be extruded in smaller sizes and thinner walls. For example, tubing ⅜ in. in diameter, with 0.008 in. wall thickness will be available in 1958.

Rapid strides in the extrusion of molybdenum tubing are expected in 1958. Successful extrusion was announced last year, but more study is required to produce smaller diameter, thinner walled tubing. Molybdenum is of interest to atomic energy, missile, and rocket fields.

Expanded Beryllium Supply To Spur Atomic, Aircraft Uses

—EDMOND M. VELTEN

This year will see greatly expanded production of nuclear grade, beryllium billets as the result of plant start-ups on AEC requirements. An increase in reactor components fabricated from the metal and oxide should develop.

But the dominant use of beryllium continues to lie in beryllium-copper and light metal alloys. Its potentialities as an aircraft structural material will be evaluated by research and development programs, both government sponsored and independent. Some are already underway.

The first large scale industrial output of nuclear grade beryllium is coming from privately financed plants recently completed. During a five-year period the facilities will produce 1 million lb for government reactor projects. Atomic energy interest in beryllium stems principally from its effectiveness as a moderator and reflector of neutrons, coupled with its low mass.

Beryllium-copper alloys are well suited to present day objectives in consumer and industrial product design. There are also encouraging prospects of more extensive use in aluminum and magnesium alloys.

Ultrahigh Strength Steels Move Into Application Stage

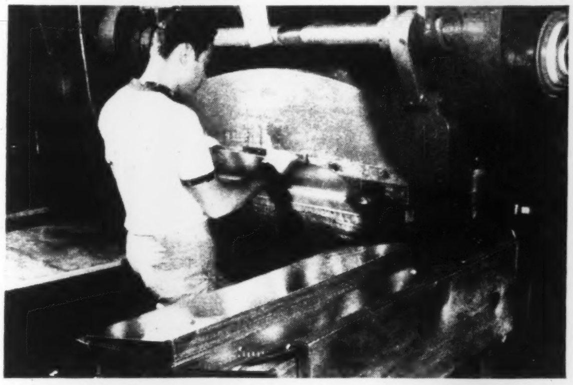
—JOHN C. HAMAKER JR.

Ultrahigh strength, heat resistant steels have progressed from the testing and development stage to such applications as aircraft framework and critical parts, missile components, high strength fasteners, and atomic

Production Takes A Short-Cut

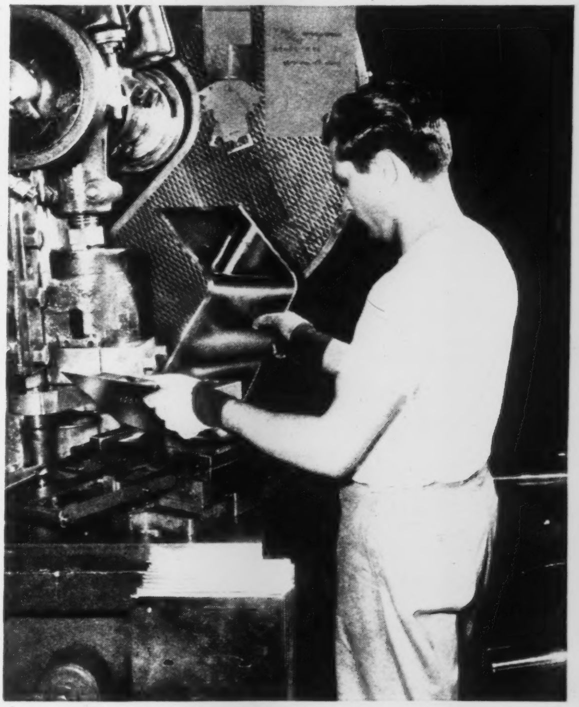
With Pre-Plated NICKELOID METALS

Sheet of Nickeloid chrome-steel that will be used for breadbox is blanked, with punch-out perforations for ventilation and indented shelf supports. Uniform pre-plated finish reduces rejects.



Edges of Nickeloid chrome-steel sheet are turned up ½" in forming press. Nickeloid is easily worked with standard methods.

Breadbox body frame is spot-welded to the preformed bottom and back pieces, with no visible oxidation. Parts then move to assembly.



Two bends are made on press to give the breadbox its rectangular shape. Operation causes no marring of surface or dulling of finish.

No Cleaning or Post-Plating — Easily Worked With Standard Production Methods

No cleaning solutions, plating tanks or polishing wheels on the production line at Lincoln Metal Products Co., Brooklyn, N.Y., manufacturer of fine pantryware. Lincoln eliminates these costly intermediate steps by using Nickeloid pre-plated chrome-steel and copper-steel. These versatile design materials speed trouble-free production, reduce rejects, prolong tool life. They are readily worked with standard production methods, as shown here. Parts move from fabrication — to assembly — to packing, with no dulling or marring of the pre-plated finish, since Mar-Not protective covering is used. No cleaning, plating, polishing is needed. Nickeloid Metals are available in pre-plated finishes of chrome, nickel, copper or brass on steel, zinc, copper, brass and aluminum. Sheets, strips, coils — a wide range of finishes and patterns.

Write For Free Literature

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SINCE 1898
NM

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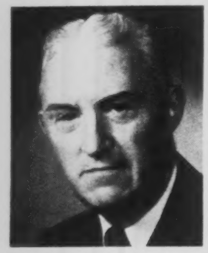
Peru 1, Illinois

N. W. BASS
Vice President, Brush Beryllium Co., Cleveland

J. H. JACKSON
Manager, Dept. of Metallurgy, Battelle Memorial Institute, Columbus, Ohio



RALPH L. WILSON
Director of Metallurgy, Timken Roller Bearing Co., Canton, Ohio

reactor components. Protective coatings have been developed to take advantage of the superior fatigue strength and strength-weight ratio of these steels while providing corrosion and oxidation protection to 1000° F, or higher. This year should see further developments in processing and fabrication of ultrahigh strength steels as production requirements increase and new uses arise.

Recent research results indicate a yield strength of about 390,000 psi for high speed steel—the strongest material now available that can be fabricated. New compositions are being investigated in an attempt to bridge the gap between low ductility, high speed steel and the 250,000 psi yield, 300,000 psi tensile strength, structural materials now available.

Results indicate the need for new design criteria on ductility, notches, stress-raisers, etc., if designers are to take advantage of the higher strength levels desired. New steels are also under development for ultrahigh strength properties to 1100-1200° F.

Beryllium Has Bright Future In Aircraft and Missiles

—N. W. BASS

Perhaps the most far reaching development in beryllium in 1957 was its recognition as a lightweight, high strength metal for advanced aircraft and missiles. Applications include structural and "heat-sink" purposes and ultraprecision machined gyroscopic components in inertial guidance devices.

Beryllium is as light as magnesium; its stiffness modulus is 40 per cent greater than that of steel, and its strength-weight ratio is superior to that of titanium, aluminum alloys, and the aircraft steels. Its melting point is twice that of aluminum. It has high specific heat, good thermal and electrical conductivity, excellent corrosion resistance in air, and good resistance in water.

Beryllium is readily machinable when fabricated by our powder metallurgical process, QMV. It's available in all commercial forms, such as blocks, machined shapes, extrusions, and rolled sheets. We recently hot pressed some blocks of QMV beryllium over 5 ft in diameter which weighed over 2500 lb each.

We feel beryllium is destined to play an important role in long range aircraft and missiles. For the present, the atomic energy field will use the bulk of the pure metal.

More High Temperature Alloys Will be Used in Sheet Form

—J. H. JACKSON

Fundamental metallurgical studies are becoming more directly applicable to the solution of practical problems. One new tool is the electron microprobe. It permits qualitative analysis of inclusions and grain boundary areas in metals. Zone refining and electron beam melting are being used to melt the extremely pure metals. The availability of pure metals has increased the effectiveness of new alloy development studies. Ceramic crystals have been rendered ductile.

Production of sheets from powder is attracting renewed interest, especially in the investigation of beryllium as an aircraft structural material.

Requirements for supersonic aircraft materials have resulted in the first application of titanium alloys strengthened by heat treatment and in the initial use of brazed sandwich structures made of heat treatable stainless steels. The next developments to expect are the production of wide, thin gage sheets and strip from heat treatable titanium alloys and the increased application of the new precipitation hardenable stainless steels. Modifications of hot work die steels and straight chromium stainless analyses in sheet form are expected soon.

Designers of rockets and missiles are expected to call on the metallurgists for molybdenum and perhaps columbium-base sheet products. The new aluminum-lithium alloys will extend the temperature range of application with concurrent reduced density. Magnesium alloys for intermediate temperature are available in a broader range of shapes and forms.

Two New Low Alloy Steels For High Temperature Bearings

—RALPH L. WILSON

There is a growing demand for low alloy steels for use in antifriction bearings which operate up to about 600° F. As better high temperature lubricants become available and adequate systems of lubrication are devised, more attention is being directed to the steels needed. Traditionally, ball bearings have been made of through hardening steels of high carbon content, mainly 52100; the components of tapered roller bearings have been produced from carburized and hardened, low carbon, alloy steels such as 4620. A through hardening grade and a carburizing grade of considerable promise have been developed around the base analysis of the regular 52100 for service at moderately elevated temperatures.

The typical composition of the ball bearing steel is carbon, 1.00 per cent; manganese, 0.70; silicon, 1.00; chromium, 1.40; and molybdenum, 0.30. Using hardness as the criterion of strength, the good properties are shown by the high recovered hardness of 59 Rc (measured at room

DREVER
COMPANY

New Continuous Heat Treating and Tempering Furnaces Insure Close Temperature Control

Produce 400 series stainless bars to uniform hardness requirements

Known as the quench and temper method, this new Drever Long Bar Furnace, recently installed at J & L's Stainless Steel Division in Detroit, insures a more uniform hardness in stainless steel bars. It can handle a variety of sizes and shapes from ½ to 4½ inches in diameter and up to 30 feet in length.

This furnace is designed so that it can be switched from a normalizing to a quench and temper operation without interrupting its continuous operation.

With the addition of this new furnace, J & L's Stainless Steel Division can now offer its customers the uniform hardness they require today in stainless steel bar stock . . . just another reason why J & L is a leading producer of quality stainless steel bars.

This quality control, plus the ability to ship a wide range of finished stainless bar stock . . . immediately from inventory . . . is an unbeatable combination that J & L offers to its customers.

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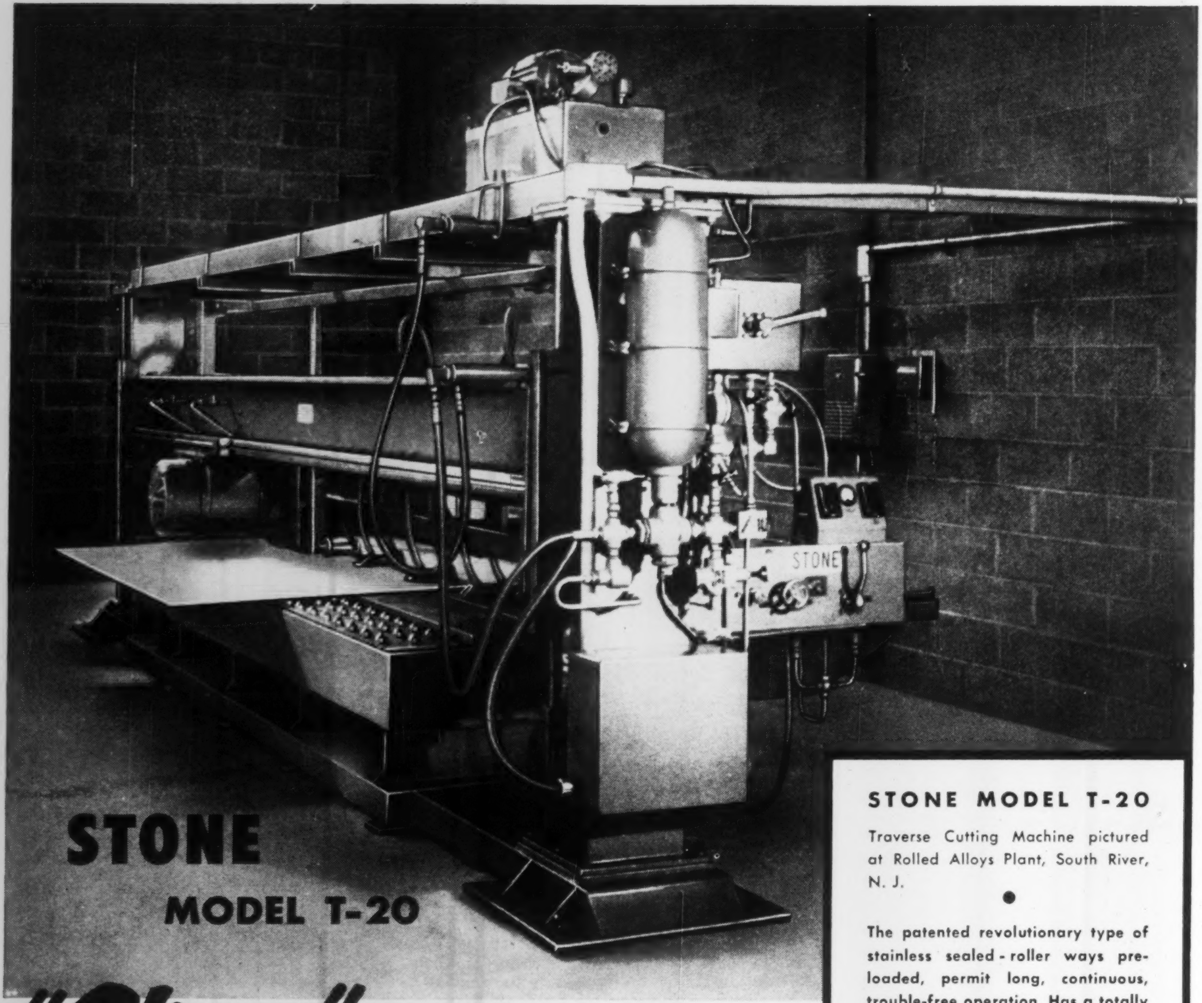

STONE

MODEL T-20

STONE MODEL T-20

Traverse Cutting Machine pictured at Rolled Alloys Plant, South River, N. J.

●

The patented revolutionary type of stainless sealed-roller ways pre-loaded, permit long, continuous, trouble-free operation. Has a totally enclosed heavy-duty floating type steel safety guard, parallel work stop gauge and positive clamping device.

"Slices" THROUGH STAINLESS STEEL

This new Stone Model T-20 Traverse-Type Cutting Machine cuts one-inch stainless steel at approximately 3 feet per minute.

The Stone T-20 cuts ferrous, non-ferrous and non-metallic sheet and plate.

CLEAN CUTTING . . . HIGH SPEED . . . ACCURATE

The new Stone T-20 Model is the result of more than three years of engineering. It's the most versatile and rigid completely-hydraulic-operated traverse-type machine on the market today. Each feature of the T-20 is designed for speed and accuracy *with* safety. Hydraulic lateral feed 0-50′ speed per minute. The speed of raise and lower of cutting head is from 0-10′ per minute. Length of cut 12′ with raise and lower 24″.

SPECIFICATIONS STONE MODEL T-20

Capacity: 4″ ferrous or 8″ non-ferrous depending on material. Consult our engineers.
Size: 21′ x 8′ x 8′
Weight: 12,000 to 14,000 lbs.
Arbor Speed: 2360 RPM (others from 630 to 2900)
Actual Cutting Times: 1″ x 10′—3 min., 45 sec.
3/4″ x 5′—1 min., 15 sec.
Full 20 H.P. geared-in-head, T.E.F.C., induction type, continuous duty motor
Wheel Diameters: 20″ x .150 to .170 (Larger diameters upon request)
Arbor Size: 1 3/4″
Heavy Duty 8″ steel wheel flanges. Cuts with an abrasive wheel on ferrous metals; steel saw blade with oil mist spray on non-ferrous.

Write for more information

STONE MACHINERY COMPANY, Inc.

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MANLIUS, N. Y.

temperature) after holding 500 hours at 600° F. The hot hardness (measured at temperature) after 500 hours at 600° F is 53 Rc, which is extraordinarily high for a low alloy steel.

The carburizing steel contains about 0.20 per cent carbon, 0.60 manganese, 1.00 silicon, 1.45 chromium, and 1.00 molybdenum. Again, resistance to tempering and high hot hardness are evidences of good stability and strength. At the 1.00 per cent carbon level in the case, the hot hardness is 56 Rc and the recovered hardness 61 after 500 hours at 600° F. At the 0.70 carbon level, the corresponding figures are 55 and 58 Rc and for the core 40 and 37 Rc.

Both steels can be handled in essentially the same manner in manufacturing operations as their conventional counterparts. A number of mechanical tests, made on complete bearing assemblies under simulated service conditions, have confirmed the potential usefulness of the alloys. Applications in other fields will be explored after introducing them to the antifriction bearing industry.

Sees More Use of Casting, Cold Extrusion by Automakers

—M. F. GARWOOD

There is a continuing trend toward minimizing, or eliminating, metal removal by the use of precision castings. In some cases, adequate dimensional control and surface quality may be obtained through the use of a cold coining operation. Shell molding, the CO_2 process, permanent mold, and improved sand casting methods will find more applications. The processes will be used extensively with ductile irons.

Investigations are in process to improve anodizing. The aim is to provide stylists with decorative materials that will have stable colors other than the traditional chromium plate. The use of permanent mold and diecast parts, (they now weigh up to 22 lb) will show steady growth, particularly in engine, brake, and wheel components.

The introduction of vacuum diecasting techniques for aluminum promises an improvement in physical properties. They offer new possibilities for decorative parts and functional applications.

In the near future, advances in metal joining will be reflected in new frame and body designs and manufacturing techniques. Metal spraying is presenting opportunities for the use of low carbon steels and nonferrous materials in applications requiring wear or corrosion resistance.

There will be greater use of cold extrudable materials since they afford many opportunities for economy through scrap reduction, elimination of machining, ability to hold dimensions, good finishes, and improved physical properties.

New Copper-Base Laminates Are Produced by Brazing

—M. A. BUELL

Much interest has developed in heat treatable copper-base alloys containing nickel and silicon and copper-titanium combinations.

In the brasses and bronzes, the use of fine grain (0.010 mm) and special processing gives better finishes and allows greater formability. In addition, the endurance limit of these materials is improved. The use of fine grain structure is spreading into other copper-base alloys for specific purposes.

Advancement of methods for nondestructive testing of copper-base alloy mill products (notably tubing) are being studied. Such equipment, employing eddy current methods, may be expected to improve the standards of surface and internal inspection.

Progress is being made in producing laminates, either duplex or triplex, employing copper and copper-base alloys with nickel alloys, such as Monel, stainless, mild steels, and many other metals. It has been done by brazing, which gives a good metallurgical bond. An important application: Tube sheets used in oil and chemical processing equipment.

High speed, automatic screw machines are being developed to run at 7500 and 10,000 rpm. Better quality free cutting brass rods, closer tolerances on diameter, and straightness will be required.

M. F. GARWOOD
Chief Engineer, Materials Laboratory, Chrysler Corp., Detroit

M. A. BUELL
Chief Staff Metallurgist, Bridgeport Brass Co., Bridgeport, Conn.

W. E. JONES
Manager, Vacuum Melted Products Project, Metallurgical Products Dept., General Electric Co., Detroit

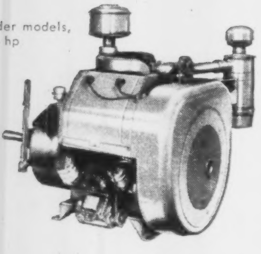
Vacuum Melters Will Double Capacity, Diversify Uses

—W. E. JONES

Looking into 1958, one sees a rapidly growing vacuum melting industry which is just beginning to expand its markets into areas outside jet aircraft. It appears that 1958 capacity will be about double that which was available in 1957.

Last year saw a great deal of progress with the introduction of several new high temperature alloys with applications in the jet engine industry. Production problems were met and sizeable cost reductions were realized.

This year will see increased emphasis on diversification. The roles played by the various melting techniques are becoming fairly clearly identified. It seems apparent that a large portion of the tonnage type of business, particularly with the intermediate temperature alloys, will be produced through the vacuum arc melting systems. The high temperature alloys and the special forms in which they are often required will continue to be satisfied by the vacuum induction system. Both areas



V-type 4-cylinder models, 15 to 56 hp

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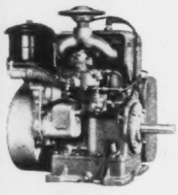
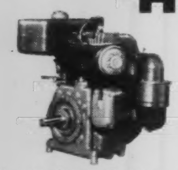


2-cylinder models, 10 to 18 hp.

WISCONSIN Heavy-Duty Air-Cooled ENGINES...



4-cycle Single Cylinder models, 3 to 12½ hp.

Supplied in a highly selective range of sizes from 3 to 56 hp., in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder models, the Wisconsin line offers the power user the *right engine* to fit the job and the machine, without power waste and with the greatest power advantage.

- All Wisconsin Engines are of heavy-duty design and construction ... to provide the inbuilt stamina, long-life endurance and low-cost maintenance so essential to heavy-duty service applications. Every Wisconsin engine is equipped with such extra-value features as tapered roller main bearings at *both* ends of the drop-forged crankshaft. Even the smallest models are supplied with FOUR piston rings.
- All Wisconsin Engines are of basic High Torque design to provide maximum *usable power* ... the *Load-Holding Lugging Power* that *hangs on* and *carries on* under severe shock-load operating conditions.
- All Wisconsin Engines can be adapted to operation on a variety of most readily available fuels . . . gasoline, kerosene, LP fuels, natural gas or fuel oil of 38-42° Baume gravity and 135 Octane rating.
- All Wisconsin Engines are AIR-COOLED for efficient, trouble-free operation at temperatures from low sub-zero to 140°F. (60°C.).
- All Wisconsin Engines are backed by a world-wide service organization. More than 2,000 Authorized Wisconsin Engine Service Stations carry a stock of factory-recommended parts for *all models*.

The power user gets "more engine" per horsepower and per dollar invested in dependable driving power.

SPECIAL EQUIPMENT — All models can be supplied with variable speed controls, clutch take-off assembly, electric starter and generator (or starter only), Stellite exhaust valves and valve seat inserts (regularly supplied on Models THD, VG4D and VR4D) and positive type Valve Rotators. Clutch reduction assemblies available on all models except VG4D and VR4D. Rotating screen available for all models. High Temperature Automatic Safety Switch also available on all models except small single cylinder models. Special equipment must be specified at time engines are built.

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WALTER L. FINLAY
Vice President & Manager of Research, Rem-Cru Titanium Inc., Midland, Pa.

are growing to accommodate the potential business that is available in the years ahead.

Vacuum precision casting will begin to show itself in the market place during 1958 with its great potential for the production of highly controlled castings.

Titanium Alloy Strip To Be Available in '58

—WALTER L. FINLAY

The most important advance in titanium last year was made by three mill producers. They achieved the target properties of the Department of Defense sheet alloy program.

At year's end, the first sheets are being delivered to the airframe industry for testing.

The advance in sheet properties by heat treatment was paralleled in forgings and bar stock where high strength, heat treated properties were specified for several grades. A new forging alloy, C 135AMo (7Al-4Mo), for example, has a guaranteed minimum tensile strength of 170,000 psi.

Though considerable tonnage of commercially pure titanium sheets has been produced on continuous strip mills, virtually all alloy sheets have been made on hand mills. Strip rolling promises higher quality and lower cost. Late in 1957, coils of C 120AV (6Al-4V) were rolled with good yields and uniform properties. Prospects for alloy strip in 1958 look good.

Nonmilitary sales in 1957—chiefly corrosion-resistant chemical equipment and commercial air transport applications—were about 600 per cent

How to reduce Investment in costly Steel Inventories

You can eliminate costly, large-scale inventories by taking advantage of the services maintained by your steel service centers. Varied steel stocks and modern processing equipment make available the grades, shapes and sizes of steel you need . . . on just a few hours' notice.

Alan Wood supplies major steel warehouses with top quality products which help them meet customer requirements.

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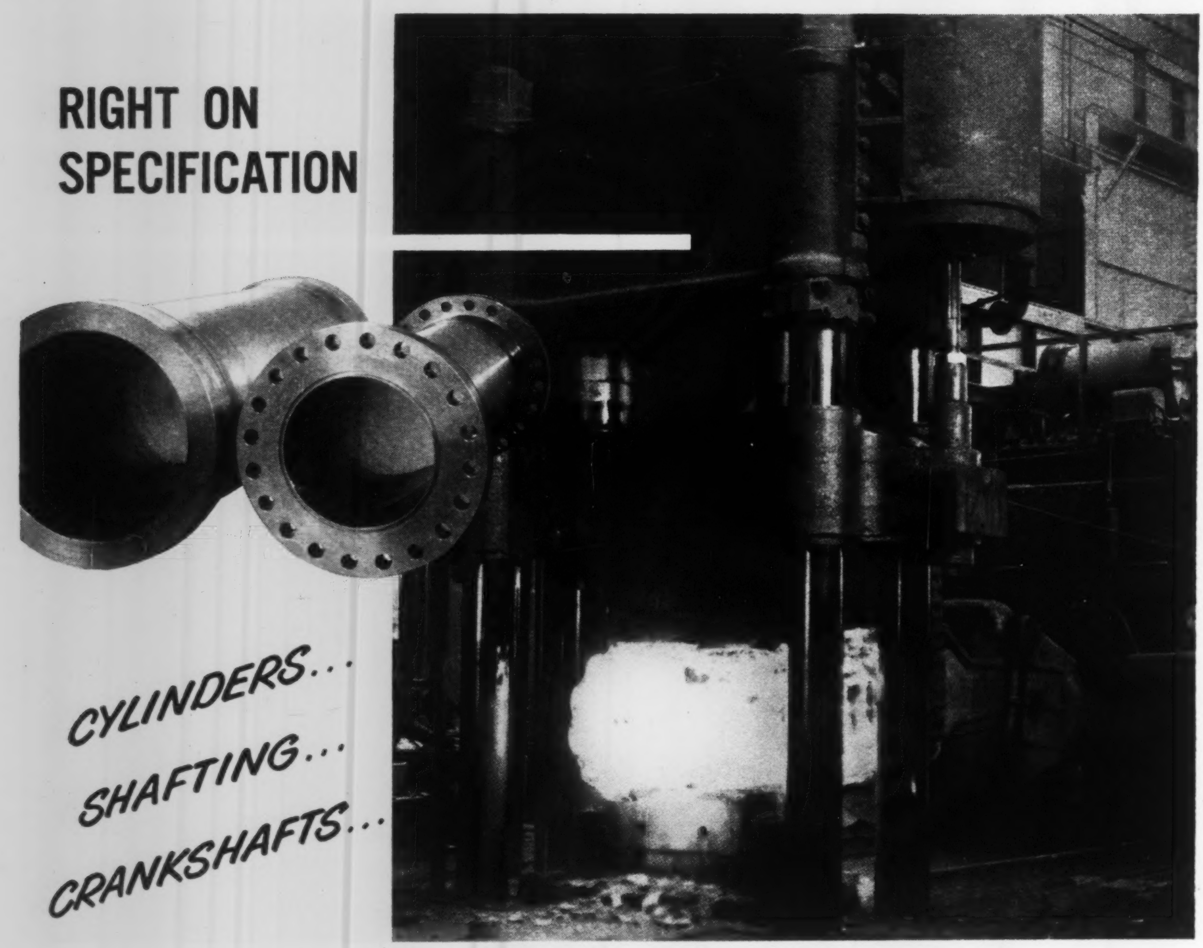

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Titusville Forge is accustomed to producing large and heavy forgings to exacting customer specifications for size, section, grain structure, heat treatment and finished machining. For broad experience on forgings of all sizes and complexity—capable facilities and good service, depend on Titusville Forge.

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FORGE DIVISION

Crankshafts . . . Pressure Vessels . . . Hydraulic Cylinders . . . Shafting . . . Straightening and Back-up Rolls

M. J. DAY
Vice President-Research & Development, Crucible Steel Co. of America, Pittsburgh

above the 1956 mark. This market will be increasingly important.

Alloys Are Evaluated For Critical Jobs

—M. J. DAY

There is a continuing demand for construction materials with higher engineering strength at elevated temperatures.

The need is being met by taking a more critical look at present materials to assess their suitability for a given requirement. The use of hot work tool steel for aircraft structural applications is an example. High speed steel is being used for hot aircraft bearings—the conventional bearing steel (52100) is inadequate for the job. Considerable progress is being made in the development of improved alloys for those and other applications.

Nuclear power projects are demanding materials with unusual properties. Besides high temperature strength and corrosion resistance in reactor components, designers are concerned with irradiation stability and neutron absorption. Manufacturing costs of components have to be reduced appreciably before commercial nuclear power reactors can be designated for domestic use.

Better Magnetic Performance Of Nickel Steels Coming

—C. B. POST

We can look forward to new levels of magnetic performance in some of the higher nickel steels—such as

(*Please turn to Page* 284)

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are made
"SPLIT-TO-PULL"

An entirely new Verti-Line concept for vertical industrial pumps. The discharge head is "Split-to-Pull" making possible many advantages never before available with this type of pump. Here are just a few:

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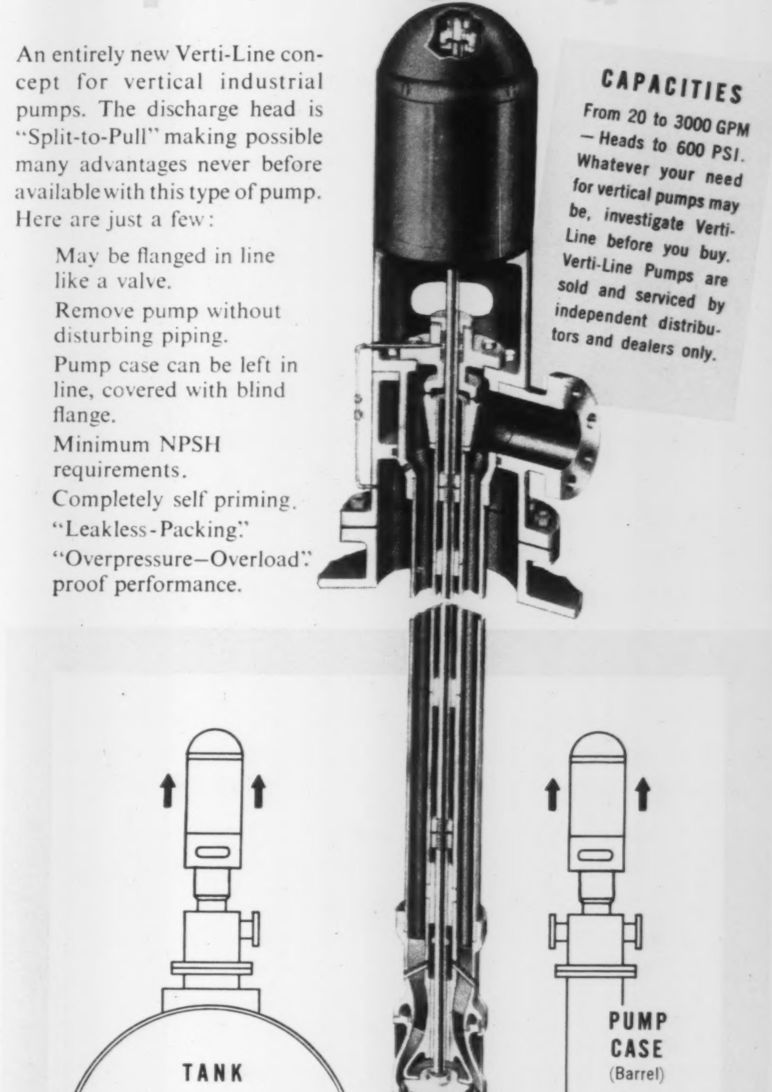

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Uniform Quality. In this Packing and Inspection Room, National hinges are given a final check, packed, and sent to retailers. They use USS Amerstrip because it comes with a consistently good finish for plating purposes.

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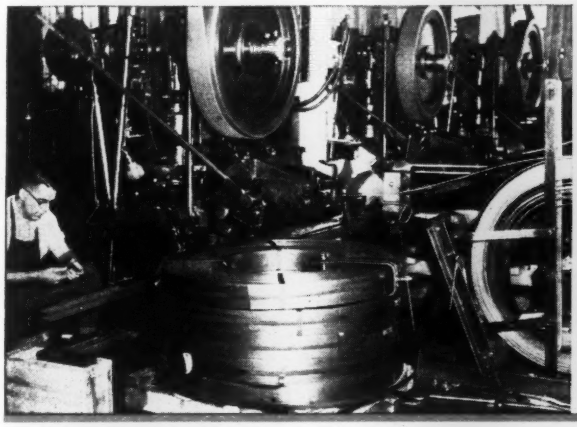
twenty-one high-quality finishes

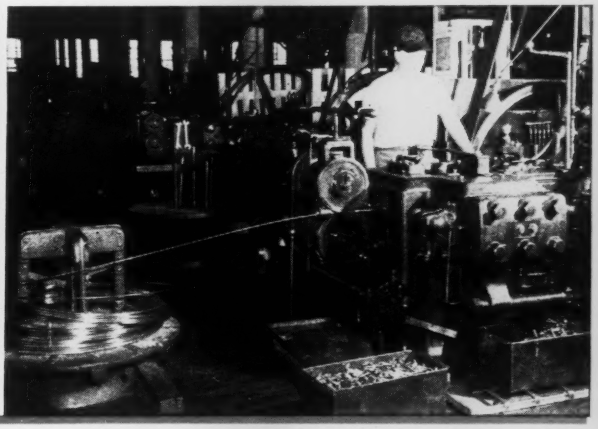
FOR 56 years the National Manufacturing Company of Sterling, Illinois, has been producing quality hardware. They began with a patented tail gate hardware set for wagons and have since expanded into a complete line of builders' hardware.

National produces a well-known line of hinges in 21 attractive finishes. They need a strip steel which will allow high-quality finish, and they use USS Amerstrip.

If you need strip steel with special qualities, choose USS Amerstrip. It comes in a complete range of analyses and tempers in carbon, stainless, and alloy steels . . . in coils or cut lengths . . . with a round or square, natural or rolled edge . . . and in all commercial finishes. American Steel & Wire has a large, experienced technical staff. These steel specialists can help tailor Amerstrip to your individual needs.



Holds Finish. This Midwest Punch Press is using $3\frac{1}{2}''$ .109 Amerstrip to punch 100 hinge leaves per minute. Strip for hinges must hold its finish, yet be able to take slight abrasion. It must be neither too soft nor too hard. USS Amerstrip more than fills the bill.



Amerhead Hinge Pins. This Header is using .272 Amerhead Cold Heading Wire and is producing 140 pins per minute. They use Amerhead Cold Heading Wire because its strength and ductility guarantee long service for their high-quality hinges.

Amerstrip

USS

American Steel & Wire Division

United States Steel Corporation
Columbia-Geneva Steel Division, San Francisco
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

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C. B. POST
Vice President & Technical Director,
Carpenter Steel Co., Reading, Pa.

those ranging from 49 to 80 per cent nickel. Current knowledge of square and oriented properties will probably lead to the development of a number of new products for specialized applications. Benefits should extend to miniaturization and greater controls for automation. With the trend toward higher operating temperatures of steam turbines and jet engines we can look for improved alloys with higher strength levels at higher temperatures. There will be more vacuum melting of materials for jet engines.

Noticeable strides are also being made in the quality and performance of welded tubing in corrosion and heat resisting applications. We can look forward to welded tubing which is practically interchangeable with that made by the seamless process.

The requirements of the atomic energy industry indicate that we will have fabricating materials of superior quality in grades now known. The needs in that industry do not necessarily call for newer materials. Better purity and quality can do the job.

Needs of Many Industries Met by Stainless Extrusions

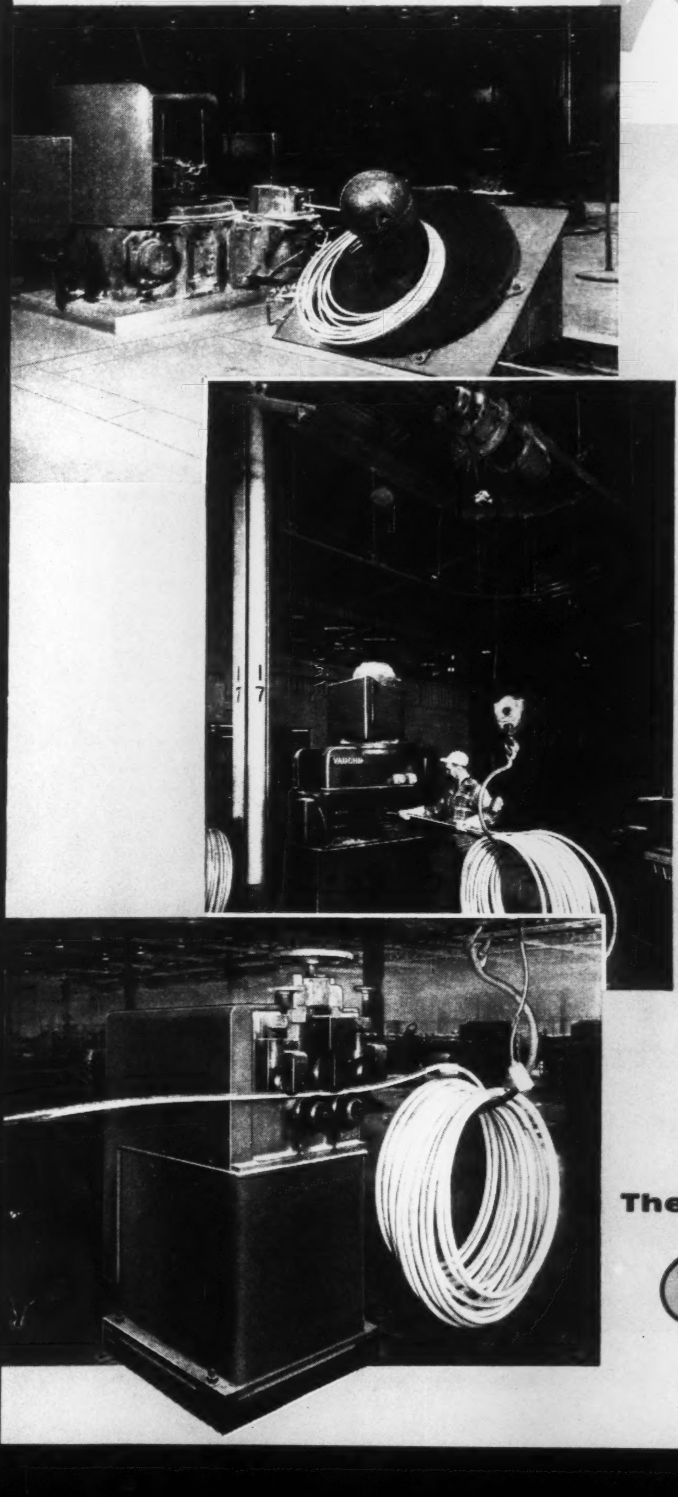
—RICHARD E. PARET

New proprietary stainless steels and the AISI standard types continue to meet the fantastic heat, strength, and lightness requirements of aircraft and missile technology. Stainless honeycomb sandwiches are being designed into supersonic aircraft at critical areas around jet engines. Stainless alloys are also solving high

A TIP FOR THE TIMES

SPEED HEAVY WIRE PRODUCTION

with ADVANCED **Vaughn** AUXILIARY EQUIPMENT



new FLOOR REEL

with Positioning Base

Meeting today's need for better pre-drawing preparation and handling of heavy wire, Vaughn presents this new Floor Reel upon which the coil is lowered, with Positioning Base. This advanced equipment permits the straightened, pointed wire end to be passed through die to grip with small effort by the operator—and better production!

new *Extra-Heavy* 4-ROLL CONTINUOUS POINTER

This king-size pointer is capable of accommodating a range of wire from ½″ to 1¼″. It has two vertical and two horizontal rolls for ease of pointing without twisting the wire, and is in every way a heavy, rugged, long-life machine for the most arduous service.

new ROLL STRAIGHTENER

At the beginning of the pre-drawing preparation cycle is the new Vaughn 3-roll straightener, where a section of the trolley-transported wire coil is mechanically straightened. This makes handling to pointer and die box an easy matter, contributing to the time and manpower savings that help boost production with modern Vaughn equipment. Details? Gladly, on request.

The Vaughn MACHINERY COMPANY

Cuyahoga Falls, Ohio, U.S.A.

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RICHARD E. PARET
Committee of Stainless Steel
Producers, American Iron & Steel
Institute, New York

temperature missile needs, such as propellent tanks, skins, warheads. Even in launching platforms and test stands, where instantaneous temperatures may rise as high as 5000° F, stainless is giving unique service.

Perhaps the most far-reaching developments in the processing of stainless forms and shapes are due to the rapid strides being made in extrusion. Here, the design of compact, more powerful extrusion presses, the use of new lubricants other than glass, improved extrusion dies, the application of stretching and straightening equipment are solving many problems. Such advances support the rising importance of stainless extrusions to meet the needs, not only of the aircraft and missile industry (where they have been used for some time) but also in the machine, automotive, appliance, architectural, critical steam boiler, and atomic reactor fields.

Stainless will continue to find increasing automotive use in mechanical components such as top and bottom tanks for radiators, in oil coolers, in piston rings, and in large stampings such as the bright roof top for the Cadillac brougham.

Recent technological advances are making it possible to offer stainless in a variety of special finishes and surfaces to meet the demands for more colorful architectural treatments.

One manufacturer is currently installing blue enameled stainless steel panels. The Union Carbide Bldg. (now under construction) will use special black stainless steel spandrels obtained by newly devised thermal and atmospheric treatments.

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Backbone of America's growth: steel plate

Heavy carbon steel plate from Barium Steel mills at Harrisburg, above, along with structural steel from Phoenixville, has been helping to build America for almost a century.

Today, these basic steel products go into bridges, ships, railroad cars, process equipment, and capital goods of all kinds. With such diversified applications in so many expanding industries, the demand for these "staples" in steel continues to grow. Specialization in these "staples" . . . steel plate, structural shapes, and heavy wall seamless pipe and tubing . . . is an important reason for Barium's own continuing growth.

7.9

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CORPORATION

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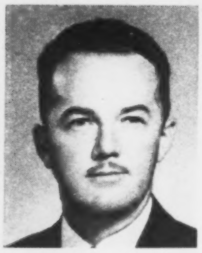
IRVING DICKTER
Chief Metallurgist, Process Machinery Div., Cincinnati Milling & Grinding Machines Inc., Cincinnati

K. U. JENKS
President, Metal Treating Institute, Lindberg Steel Treating Co., Melrose Park, Ill.



H. B. OSBORN JR.
District Manager, Tocco Div., Ohio Crankshaft Co., Cleveland

ELTON E. STAPLES
Vice President, Hevi-Duty Electric Co., Milwaukee, Wis.

FORUM ON TECHNICAL PROGRESS

Heat Treating

Concept Adds Versatility To Flame Heating

—IRVING DICKTER

Last year was one of steady progress in flame heating applications. We note growing interest in hot spinning applications, particularly for metals used in aircraft and missile construction.

Automation has been further developed in equipment supplied to such fields as automotive, refrigeration, aircraft, road machinery, machine parts, and hand tools.

A machine designed with the new "building block" concept consists essentially of a wide, functionally styled, flat top base upon which can be mounted a number of different work holding units and flame heads. The basic unit can be adapted to a wide variety of applications.

Commercial Heat Treaters Ready for Difficult Jobs

—K. U. JENKS

Last year saw further expansion and improvements in equipment for commercial heat treating. Never in its history has the industry been in such an excellent position to meet the increasing demands placed upon it.

There have recently been substantial increases in the volume of nitriding and in the demand for induction heating of large parts. Both processes reduce distortion and improve surface fatigue properties. Nitriding and induction facilities have been added in commercial plants, including two and three station motor generator sets with large scanning equipment.

Considerable attention is being directed to methods for reducing the time and cost of carburizing. Higher temperature carburizing (over 1700° F) is being evaluated. High frequency induction heating (in the presence of carburizing gases) for shallow cases is being explored.

Induction Heating To Gain In Continuous Processing

—H. B. OSBORN JR.

Induction heating will find wider acceptance in the continuous processing field.

From many standpoints its use for progressive heating represents the ideal application. Many machines have been installed for such purposes, but they have generally been routine in nature—not a direct substitution of a method of heating and limited generally to relatively low power ratings.

Tremendous interest has recently developed in turning to induction to replace the more conventional equipment, which people are beginning to realize is just as costly as induction. Applications include: 1. Strip heating to dry coatings, heat treating, and annealing. 2. Seam welding of tubing and pipe at speeds not obtainable any other way. 3. Heating bar stock for hot rolling or heading. 4. Annealing of wire and cable. 5. Heating bar stock and wire for warm heading.

Carburizing Time Cut By Higher Temperatures

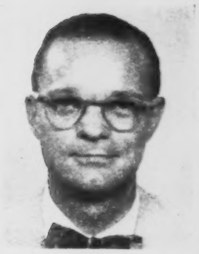
—ELTON E. STAPLES

Higher temperature gas carburizing in a ruggedly built pit furnace can save as much as 50 per cent in the time required to obtain case depth,

W. H. HOLCROFT
President, Holcroft & Co.,
Detroit

ROBERT E. FLEMING
Executive Vice President, Industrial
Heating Equipment Assn. Inc.,
Washington

J. L. WHITTEN
Vice President, Lee Wilson
Engineering Co. Inc., Cleveland



R. E. MORKEN
Consultant on Heat Treat Methods &
Equipment, Chrysler Corp., Detroit

without impairment of physical properties. The use of fine grain steels and marquenching techniques also simplifies this application.

Uses of steam atmospheres for annealing and tempering (started over 20 years ago) are being extended by improved equipment.

Higher temperatures in research require molybdenum, tantalum, and carbon resistor furnaces. Small units for oxidizing atmospheres are being built, using ceramic resistors. Operating temperatures are over the complete range to 5000° F—and above.

Today's stress on research places the electric furnace in the forefront. Its adaptability to many uses, its ease of movement (they can even be mounted on wheels), and the possibility of its construction as an assembly of units, to modify size and application, have resulted in an increasing demand.

Automation Will Increase Furnace Efficiency, Cut Costs

—W. H. HOLCROFT

Compact "turnkey" furnace installations designed with emphasized flexibility in mind plus economical operation are foreseen for 1958.

Integrated use of mechanical interlocks of actuating devices will safeguard drives and mechanisms to make operation of furnaces as foolproof as possible. Mechanisms will be simplified to decrease maintenance costs. More refractory and ceramic materials will be used in place of alloys.

Safety features will be stressed especially in installations employing gaseous atmospheres. The Lo-Dew gas converter, capable of producing both a modified A.G.A. Type 302 endothermic atmosphere and an exothermic A.G.A. Type 101 gas, will be used extensively for atmosphere applications. The unit can be coupled with suitable safety devices so the converter can be used as a supply of inert gas for furnace purging.

Research on Heating Equipment Will Benefit Users

—ROBERT E. FLEMING

An accelerated tempo in the trend toward technical improvement lies ahead for all segments of the industrial heating equipment industry.

Back of this progress is the determination to provide users with equipment which will afford greater economies in melting and heat treating operations and also satisfy the increasing requirements for superior quality control and safety.

Progress will be accounted for to a large degree by research and development in such fields as: 1. Heating under vacuum. 2. High purity protective atmospheres. 3. Higher furnace operating temperatures. 4. Continuous heat treatment of ferrous and nonferrous rolled products. 5. Low and high frequency induction heating. 6. Automated heating equipment.

Single Stack Annealing Furnaces Hit 500 Mark

—J. L. WHITTEN

During 1957, the number of single stack furnaces in operation or under contract reached 500.

Most of them handle low carbon strip or sheet coils. Some are being used for tin plate, coils, high carbon strip, and hot rolled, Series 400, stainless strip coils.

The bulk of the equipment is in the domestic market, but the export market is well represented by installations in Italy, Spain, Chile, Brazil, Mexico, and Australia. Licensees in Europe have broadened the use of single stack furnaces in the steel industry.

Product development has included: 1. Combustion equipment for firing light oils in radiant tubes when gas is not available. 2. Higher temperature furnace operations for high convection annealing at 1600° F for Series 400 stainless strip and rod coils. 3. Cast alloy convector plates for high temperature annealing. 4. A simple method of carbon restoration for high carbon rods, wire coils, and merchant bars 30 ft or longer.

Precise Control of Quenching Will Get More Attention

—R. E. MORKEN

Much effort has been directed toward reduction of distortion in parts being heat treated. Emphasis will be increased because this is one of the best opportunities for cost reduction.

Precise control of quenching will receive much attention in this program. Newly developed oils have made it possible to use quenching temperatures through the entire range of room temperature to 400° F. It's now possible to quench in the range of 200 to 300° F by using intermediate oils. Preliminary work indicates some promising results in this range. Marquenching has shown the need for precise directional con-

LEON B. ROSSEAU
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Ajax Electric Co., Philadelphia

J. H. SANDS
Executive Vice President,
Eclipse Fuel Engineering Co.,
Rockford, Ill.

A. F. HOLDEN
President, A. F. Holden Co.,
Detroit

J. A. LOGAN
President, Magnethermic Corp.,
Youngstown

trol of the extreme oil velocities required. Work with hot oil quenches also shows the need for precise control of quenchant velocity.

Comprehensive fatigue testing and stress analysis studies have given information leading to decreased section sizes in functional parts. This has permitted the use of lower alloy steels. Accompanying this trend, is the need for more precise control of protective and carburizing atmospheres.

Much thought is being given to furnace maintenance problems. Simple electromechanical devices are replacing complicated hydraulic systems to provide the mechanical motions. Ceramic furnace components are replacing some heat resistant alloy components.

New Automatic Mechanism Broadens Salt Bath Field

—LEON B. ROSSEAU

Much progress was made in the design of salt bath equipment and its applications last year.

Several installations of a new type automatic mechanism permit more efficient use of floor space and a reduction in the required height. Flexibility is equal to that of previous mechanisms. Cost is less than half that of former units.

Considerable progress was made in gas-fired equipment for descaling (where it is already in common use), quenching, and tempering. Whenever the maximum temperature does not exceed 1100° F, this type construction offers substantial economies in operating cost.

Considerable information has been developed, principally in Germany, on the control of carburizing potential in a liquid carburizing bath—providing control of surface carbon. Similar progress is being made in proving out the benefits of nitriding the common varieties of engineering steels for excellent wear resisting properties.

More Plants Use Heat Treating In the Production Line

—J. H. SANDS

More plants are tying heat treating directly into their production lines.

The greatest productive force we have today is automation. In keeping pace with the trend, the heat treating industry has developed more automatic equipment with closer control in the last few years.

Sputniks have jolted complacency in the U. S. Our drive to catch up will increase the demand for new materials. Many new developments in the heat treat field will be for producing and handling them.

Automation and modernization are the watchwords of heat treating equipment manufacturers.

Salt Bath Automation Boosted By New Handling Systems

—A. F. HOLDEN

We feel the trend in salt bath heat treatment will be primarily influenced by improved automation.

Our studies over the last three years indicate that there is a field for a safe handling system of rotary design. A machine of this type is in operation. Racks are moved into position under hoods and transferred from one station to another by harmonic motion. The six-station machine operates on a 12 to 13 second cycle for rack transfer. It is being used in one of the largest plants in this country.

The inline conveyor system using "Jack Rabbit" transfers are expensive because of the number of sprockets, chains, and drives. We have worked out the same harmonic method for our inline conveyor either with single rail or dual rail and return system. Comparing this new system with older ones, the savings in space and equipment size are substantial. Hardening furnace size is 25 per cent less; tempering furnace, 34 per cent less.

Re-evaluation of Processing Advances Induction Heating

—J. A. LOGAN

Each year we see many examples of jobs being done better by induction heating. We wonder why so many of these installations were not made years ago.

For instance, our company recently completed a 6000-kw induction heating installation for preheating 7-in. steel forging billets to 2300° F. There was nothing new about this application, yet at this late date induction heating suddenly became the best way to do the job.

Each new application of this type is preceded by an economical justification by the customer. He will consider scale loss, labor saving, power costs, depreciation, maintenance, and many other items. Perhaps a study on this same application made ten years ago could not have justified induction heating.

Today, with new forging techniques, scale may play a more important part than in the past. Labor saving certainly represents a

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L. R. HAGUE
Manager, Industrial Heating Div., Westinghouse Electric Corp., Meadville, Pa.

HAROLD W. IPSEN
President, Ipsen Industries Inc., Rockford, Ill.

H. M. HEYN
Vice President & General Manager, Industrial Div., Surface Combustion Corp., Toledo, Ohio

larger share of over-all savings than it did ten years ago, and it may weigh heavily in making a decision. Power costs have changed. We know they have gone up, but perhaps not in proportion to fuel costs. Maintenance means labor cost.

We may look for new technical developments to enhance our business; however, we must certainly look over old applications to see if new trends in processing and up-to-date evaluations might not make them more attractive to the customer today than they were ten years ago.

Induction Heating, Melting Will Require Larger Units

—JAMES R. COLEY

Vacuum melting has made notable advances with the induction furnace as the heart of the process. It's expected that the need for purer alloys in larger scale production will require the use of furnaces with greater melting capacity. Progress has been made in the use of induction furnaces with higher voltages—a must in the development of capacities on the order of 5 tons.

The use of induction heating for the high temperatures required in the development and production of carbides, cermets, and other hot pressed materials is expected to expand rapidly.

The trend toward automation throughout industry continued to spur advances in induction heating last year. There is every indication the trend will continue this year. Although the number of induction heaters purchased in 1958 may be below the 1957 figure, dollar volume will probably increase or at least remain the same. This will be due to the trend toward larger heaters to handle greater work loads, and the use of more elaborate work handling fixtures to adapt induction heating to automatic production lines.

Vacuum Melting, Processing Will Gain Importance

—L. R. HAGUE

Last year saw much progress in heat treating and melting equipment to produce higher quality products at lower costs.

For example, a 2000 ft per minute, continuous annealing line for tin plate is in operation. Similar high speed, continuous furnaces will be applied to an increasing part of strip steel output. Greater use of high speed processes in nonferrous metals is also anticipated.

Applications of specialty alloys are growing rapidly through the use of consumable electrode, vacuum, arc melting furnaces. Larger units of this type, offering lower production costs, are available. Such equipment is expected to produce a larger part of alloy materials in the future.

In the aircraft and missile industries, vacuum treating with Kold Retort vacuum furnaces has improved the brazing of honeycomb structures and the degassing of many materials.

Bright Work Heat Treating Will Get More Emphasis

—HAROLD W. IPSEN

We feel that applications for gas atmosphere heat treating equipment, especially those requiring carburization, carbon re-establishment, or carbonitriding, will continue to emphasize better finishes to minimize or eliminate pickling, cleaning, or descaling.

Intimately related to the production of bright work, is the necessity of heat treating to avoid distortion. The problem is best approached by using hot quenching.

While heavy production heat treating equipment will still be a necessity, industry will continue to minimize manhour requirements wherever possible by increased consideration of smaller modular type production units.

Sees More Mechanization Of Batch Type Units

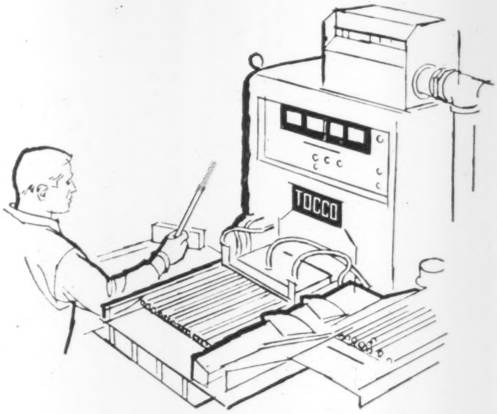
—H. M. HEYN

Objectives we have set forth for the immediate future are: 1. Improved quality control. 2. Further automation of heat treat equipment and integration into plant production lines. 3. Continued search for improved heat transfer techniques.

High quality tin plate stock is being produced at the rate of 30 tons per hour; annealing is being done at 1000 ft per minute. To transfer heat more rapidly to strip and provide faster cooling, we are applying convective heat transfer.

We expect a continued trend toward complete automation. Several lines for high production, continuous carburizing with automatic carbon control are operating. Features include metered loading, rapid heating, improved quenching, and quench presses for final sizing.

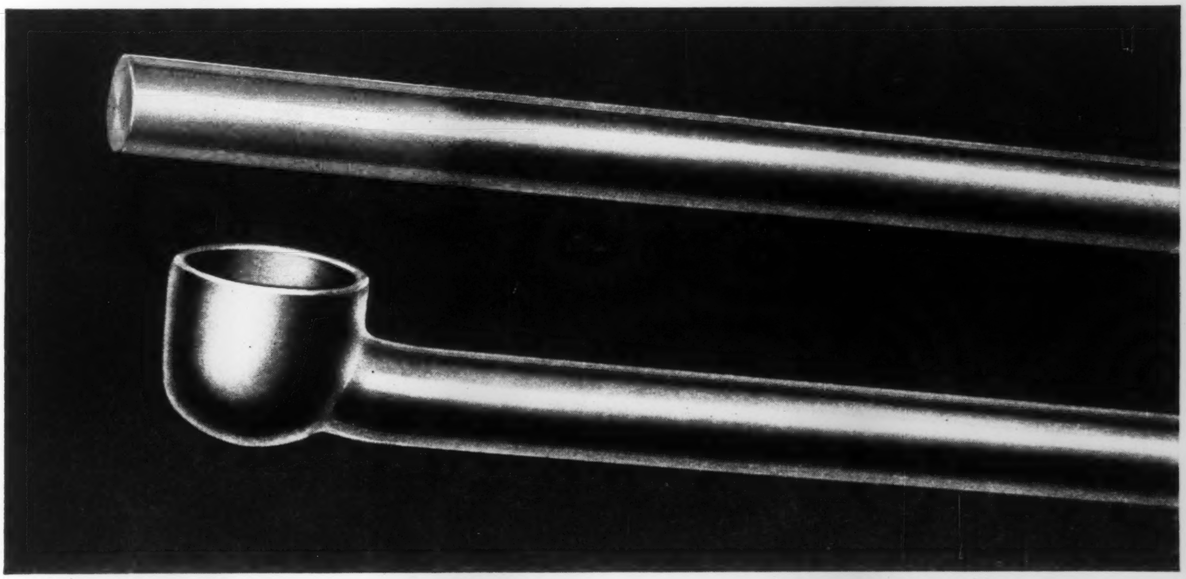
Experience gained by engineering and building the special heat treating



Heating Costs

Cut In Half

with TOCCO* *Induction Heating*



Engineers at Thompson Products Inc.'s Michigan Division recently changed from gas-fired furnaces to fully automatic TOCCO. Application: heating for forging of automotive tie rods. Result: a substantial reduction in direct labor costs, saving thousands of dollars a year on this heating for forging operation. *Annual savings actually amortize the cost of the TOCCO installation in about one year.*

The automotive tie rod shown here is only one of over 500 parts heated for forging in Thompson's new, modern forge plant. *Every one of these parts is heated with TOCCO equipment.*

If *your* manufacturing operations require heating for forging, heat treating, brazing, soldering or melting, it will pay you to investigate TOCCO as a sound method of increasing production and lowering costs.

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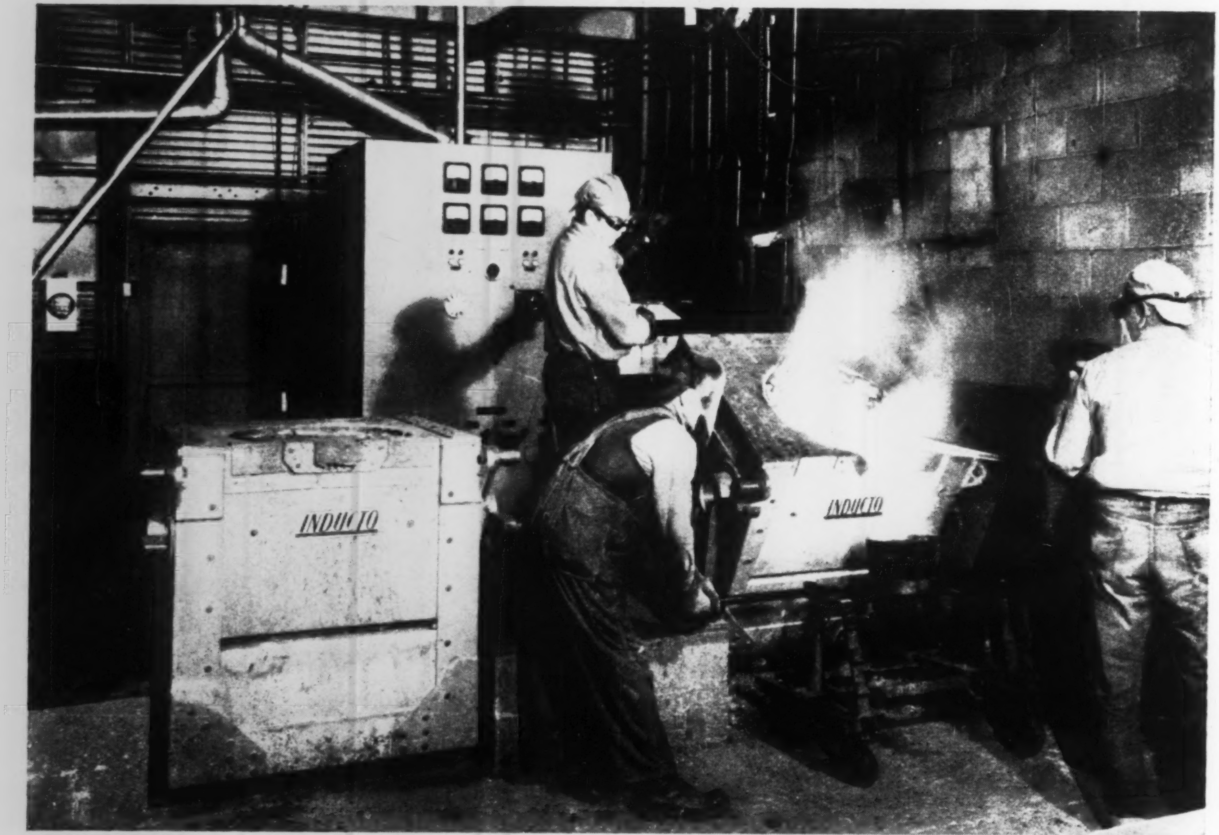

Waukesha Cuts Rejects In Stainless Castings With Inducto Furnaces

Waukesha Foundry Company, Waukesha, Wisconsin, is a major producer of stainless steel castings with emphasis on parts for dairy and other food equipment. To minimize rejects, Waukesha has installed Inducto induction furnaces in its stainless foundry. If you are wondering how a furnace can cut rejects in castings, consider the following facts.

Inducto high-frequency induction furnaces with precision control provide a controllable analysis on alloys. Since the heat is generated in the metal itself, there is no excess or external heat to cause oxidation of some of the alloys. The electromagnetic stirring action of the induction furnace assures a uniform, homogenous alloy. Additionally, melt after melt can be exactly duplicated by the precise control of the Inducto equipment.

At Waukesha, two 650 lb. furnaces and an Inducto Push-Out furnace (not shown) are operated from a 175 KW m-g set and controlled from a single, compact control panel. The tilting furnaces are used for stainless castings while the Push-Out, a unique removable crucible furnace, is used for hard-to-melt non-ferrous alloys.

Design-wise, too, Inducto melting equipment offers many advantages. Learn how you can benefit from the use of the most modern melting equipment available today. Write to:

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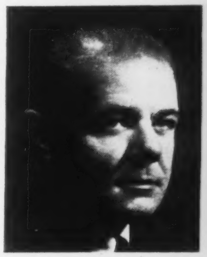
R. J. PETERS
Chief Metallurgist, Warner Gear Div.,
Borg-Warner Corp., Muncie, Ind.

HORACE DREVER
President, Drever Co.,
Bethayres, Pa.



ROBERT B. HANNA
General Manager, Industrial Heating
Dept., General Electric Co.,
Shelbyville, Ind.

CARY H. STEVENSON
Vice President, Lindberg
Engineering Co., Chicago

lines will also be of benefit in mechanizing batch type units. Where size of operation and variety of parts to be treated require the application of batch type furnaces, users will demand higher mechanization and a better layout for production flow.

Automatic Atmosphere Units Aid in Quality Trend

—R. J. PETERS

There is a continuing trend toward automation. For example, small parts taken continuously from machining go directly through continuous hardening operations.

In carburizing there is much interest in operating temperatures above 1700° F. Higher temperatures increase the carburizing rate, give higher output.

Greater use of automatic atmosphere control equipment is spurred by demands for better quality control of parts in process.

New Heat Treating Line Produces High Strength Plates

—HORACE DREVER

The second major heat treating line for steel plates went into operation early last year. It's designed to heat treat one of the new low alloy steels (¼ to 2 in. thick, up to 156 in. wide and 45 ft long) at a production rate of 5000 to 6000 tons per month. The rate has been exceeded.

The line is controlled by one operator. It consists of a 135 by 14 ft hardening furnace, a pressure flattening quench, and a 150 ft tempering furnace. All controls for the line are centralized at one pulpit.

In many instances, the high strength, low alloy plates produced on the line are replacing carbon plates for constructional purposes. A reduction in the weight of steel used is the advantage.

Fully heat treated structural shapes are expected to be a standard feature of the steel industry in the near future.

Predicts Several Trends In Heat Treatment

—ROBERT B. HANNA

We see these trends in heat treatment:

1. Furnaces and auxiliary equipment will be more completely integrated. It means automatic handling of material through several processes, such as heating for hardening, quenching, washing, and drawing.

2. There is an increasing demand for shipment of large furnaces in sections which are erected, wired, and piped at the factory.

3. Temperature requirements are increasing (3500° F is being requested frequently and will probably be commonplace in a few years). Accelerated heating and cooling are becoming more important.

4. The use of automatically controlled, protective atmospheres is increasing.

5. Vacuum brazing is becoming more important in the assembly of hard-to-braze metals. Vacuum purging and hydrogen brazing of complicated parts are also developing. Heat treatment in vacuum will be commonplace in five years.

6. Continuous annealing of strip for tin plate is growing. In five years, it is expected that 85 per cent of all tin plate strip will be continuously annealed.

7. High velocity circulating gases will be more widely used to accelerate heating and cooling and reduce equipment size. Vertical furnaces will be used to conserve floor space.

Automatic Equipment Users Seek Improved Dependability

—CARY H. STEVENSON

The trend to automation in heat treating furnaces continues. It has emphasized the need for dependability, ease, speed, and economy of maintenance. Better refractories, higher grade alloys, husky mechanical parts, and rugged control equipment are being demanded. Industries using automation realize that when they turn on the production line, it can't be turned off, even for short periods, without tremendous costs.

The automobile industry has led the way in the attack on the problem of delays in continuous operation by organizing the Joint Industry Conference (J.I.C.). For several years, it has been studying the reason for production breakdowns. It works with manufacturers to firm up the weak spots and write specifications to insure that new equipment will have the guts to keep going under the grind of modern production.

Factory Mutual is doing much the same thing with the safety problem. Customers of industrial furnace manufacturers are realizing that the extra cost of these features result in large savings over the life of equipment.

(Please turn to Page 298)

big or small, Surface mechanized furnaces pay off

Whether your volume is modest or vast—with short runs or long—there are many ways to profit from Surface experience in mechanizing heat treat equipment for ferrous and nonferrous metals. All of them give you uniform duplication of results; upgraded labor; reduced unit costs; expanded capacity; and strengthened competitive position.

➡ You may require a single batch type furnace, (right above) in which work is handled automatically from charge to discharge. For expanded facilities, a battery of such furnaces can be handled by one operator. Standard furnaces can also be linked in sequence to form an automatic heat treat line.

➡ You might want your furnaces integrated directly with machines at separate points in your production line, (right center). This line processes bearing races from raw stock through a sequence of manufacturing operations—machining, heat treating, and finishing.

➡ Your methods may call for a self-contained automatic heat treat line within your production line, (right below). Hoppers convert variable production from machining operations to the steady rate best for efficient heat treating. All operations are interlocked and continuous.

These are merely samples of the range and depth of mechanization know-how which Surface has accumulated since as far back as 1929. That was the date of installation of a completely automatic line for normalizing, hardening, and tempering transmission parts. Still operating, that line has paid for itself many times over.

Explore these advantages for your own operation; write for Bulletin SC-176.

Surface Combustion Corporation, 2385 Dorr St., Toledo 1, Ohio. In Canada: Surface Industrial Furnaces, Ltd., Toronto, Ontario.

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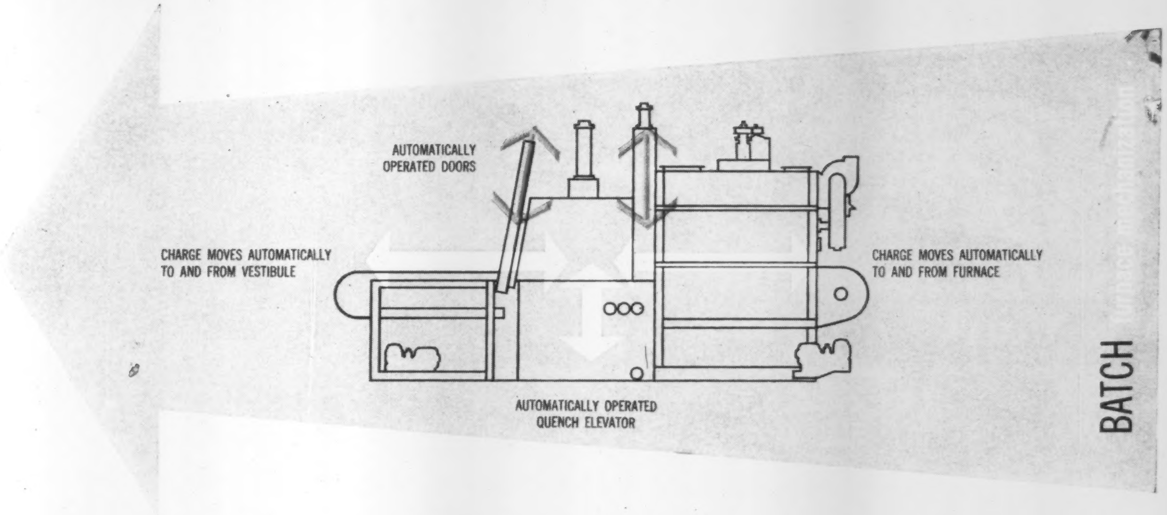
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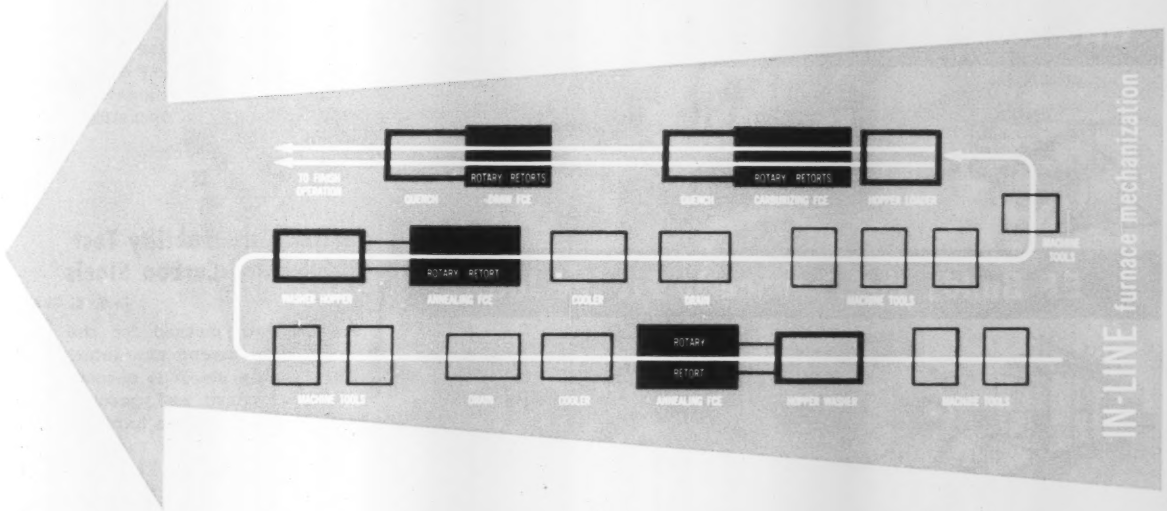
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QUENCH
DRAW FCE
ROTARY RETORTS
QUENCH
CARBURIZING FCE
HOPPER LOADER
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WASHER HOPPER
ANNEALING FCE
COOLER
DRAW
MACHINE TOOLS
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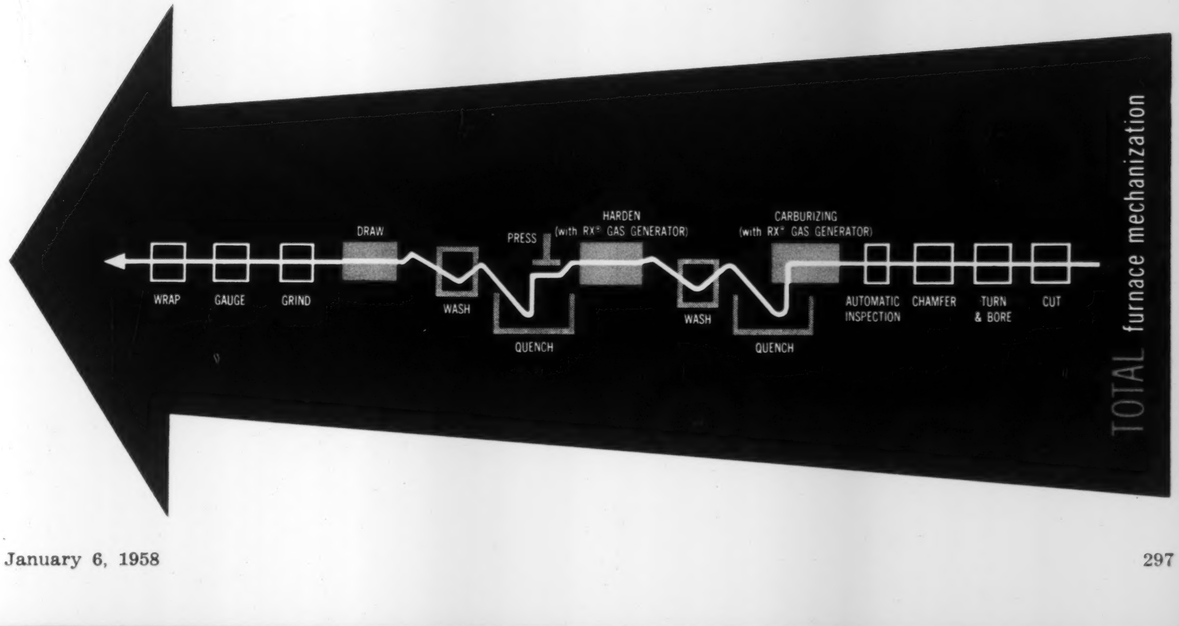
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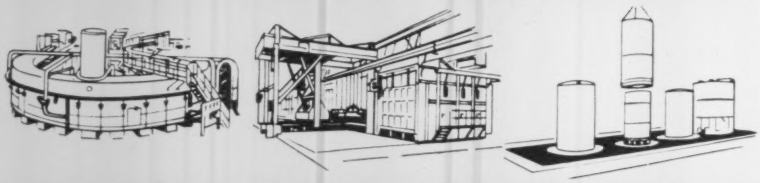

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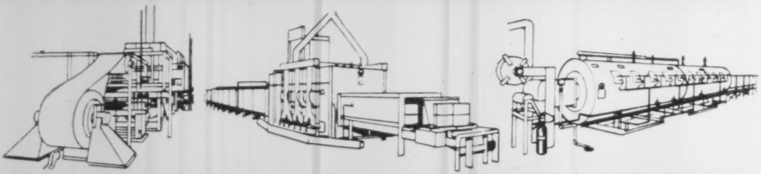
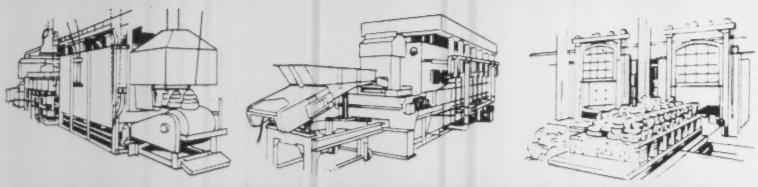


EF Builds the Furnace to Fit the Job



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A. L. JEROME
Plant Metallurgist, Caterpillar Tractor Co., Peoria, Ill.

While automation is the brightest spot in the equipment picture, more emphasis will be placed on getting increased dependability out of a technique which saves money and labor only when it is operating continuously.

Better Hardenability Test Needed for Carbon Steels

—A. L. JEROME

An accurate method for the evaluation of hardening characteristics of plain carbon steels is needed.

The standard end quench test is not satisfactory. The hardness of the Jominy bar falls off radically in the first ¼ in. or less. The slope of the curve is so steep in this critical area that experimental error often exceeds the hardenability variations sought. Also, the Jominy bands for plain carbon steels overlap. They are almost coincident for many grades; this difficulty is exaggerated by small experimental variations.

The surface-area center (SAC test), which expresses hardness in Rockwell inches, is widely used but leaves much to be desired. It's not entirely realistic where selective hardening is involved. In many applications, the designer is after the maximum hardened depths on relatively large sections. The depths that can be obtained are not precisely predicted by this type test.

In our industry, where selective surfaces of vast tonnages of plain carbon steels are hardened by water and oil quenching, the design requirements for a better hardenability test are becoming clear: 1. It must employ a realistic sample, which will

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W. A. DARRAH
President, Continental Industrial Engineers Inc., Chicago

correlate to production size parts. 2. The sample must be heat treated in a discriminating manner which will bring out (and extend) the critical area crowded in the ¼ in. of the Jominy bar. 3. It must have a precision such that the variations which might be encountered in a particular grade are five to ten times the accuracy of the test.

In all cases, we feel that the evaluation of hardenability of all steels should reflect the ultimate conditions of actual hardening applications.

Accurate Timing of Quench Improves Physical Properties

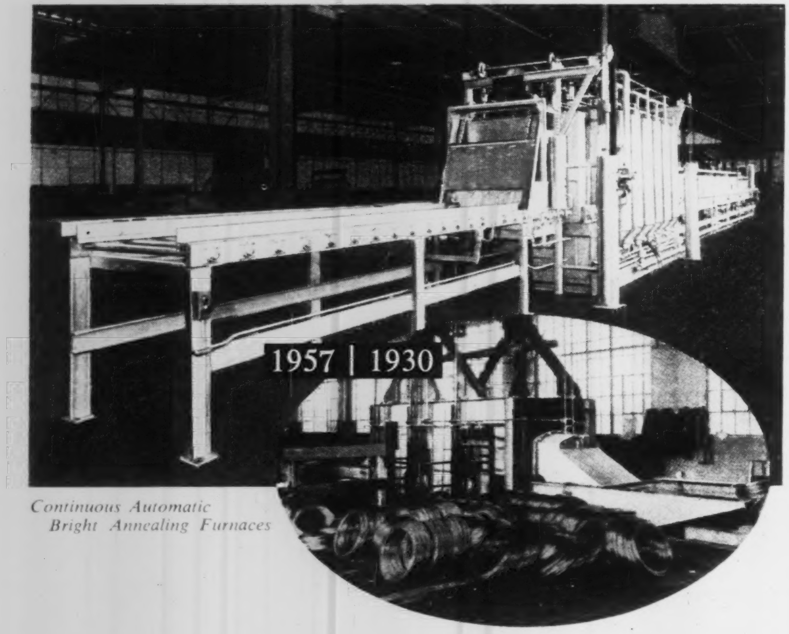
—W. A. DARRAH

Automatic handling and accurately maintained cycles are accelerating the trend to close control of the time-temperature relationships. Physical properties are correspondingly improved.

Automation makes possible split second timing in transfers and quenches. A new range of time limits in the quench pays dividends in improved grain structure and better physical characteristics. The trend promises to progress still more.

The importance of small quantities of adsorbed gases on the time-temperature cycle is now clearly recognized. Such adsorption in the newer metals is critical. Research has also shown its importance in more common metals, such as steel, aluminum, copper.

As a result, vacuum processing promises to become a basic operation for heat treating, melting, forging, and working many of the common metals.



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Continuous Automatic Bright Annealing Furnaces

Yesterday's Pioneers . . .
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Almost 30 years ago, Holcroft was leading the way in the development and refinement of continuous automatic heat treating furnaces. The furnace shown in the oval, for example . . . an oil fired, muffle-type, steam atmosphere furnace for bright annealing copper wire . . . was built back in 1930 for a prominent Canadian wire and cable manufacturer.

Holcroft's position of leadership, well established then, remains unchallenged now . . . and Holcroft's present-day version of a continuous automatic bright annealing furnace (illustrated above) perhaps best explains why. For this modern furnace bright anneals brighter, cleaner, faster. It features radiant tube heating, controlled exothermic atmosphere, complete mechanical handling, a temperature regulated cooling tunnel . . . and it will handle 2,500 pounds of copper and brass tubing per hour, straight or coiled, in sizes from tiny capillary to 3" O.D. In a word, it's *all Holcroft*, and in a heat treat furnace there's nothing finer. You'll find that out for yourself when you make your next furnace a Holcroft.

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•
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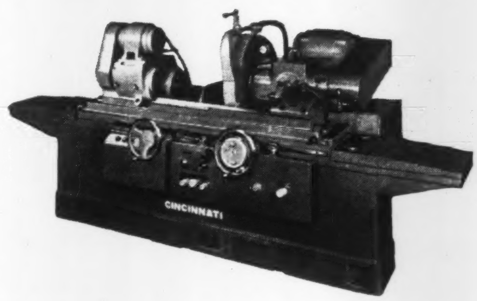
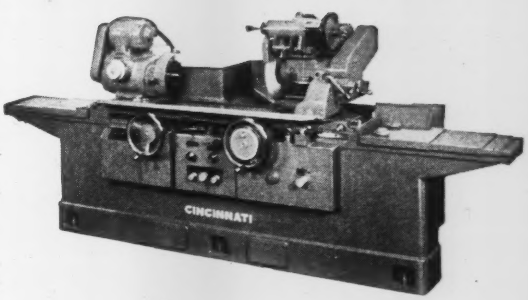


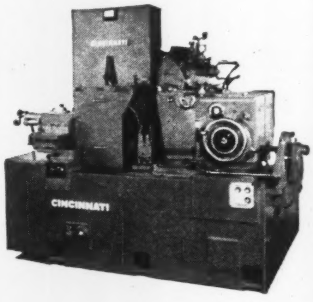
There's a CINCINNATI FILMATIC Plain Grinding Machine for your individual requirements. Just take a look at the wide selection tabulated at the right. 6″ to 16″ sizes incorporate automatic grinding wheel balancing. Many sizes may be equipped with automatic air-electric gage sizing, automatic infeed and other production features. 16″, 20″ and 24″ machines are built in both standard and heavy duty classifications.

Size	Length
4″	18″
6″R and 10″L	18″, 30″
10″R and 14″L	18″, 36″, 48″, 72″, 96″
14″ and 16″	36″, 48″, 72″, 96″, 120″, 144″, 168″
20″ and 24″	48″, 72″, 96″, 120″, 144″, 168″, 192″, 216″, 240″
20″, 24″, 28″ Heavy Duty	96″, 120″, 144″, 168″, 192″



Four sizes of CINCINNATI FILMATIC Universal Grinding Machines cover all practical requirements for machines of this type. All have hydraulic table traverse; permanently mounted hinged internal grinding head; infinitely variable headstock spindle speeds.

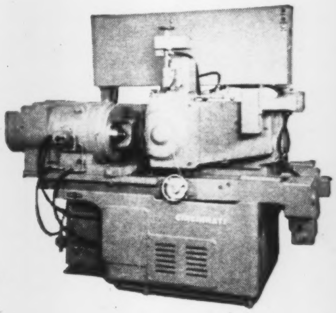
Size x length | 10″ x 24″
12″, 14″ and 18″ x 36″, 48″ or 72″



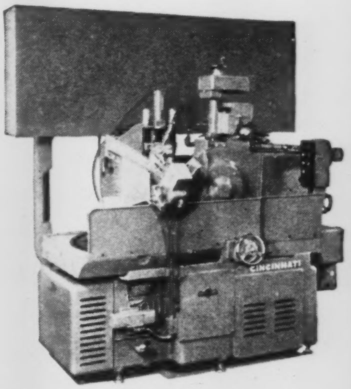
CINCINNATI FILMATIC Centerless Grinding Machines are available in six sizes.

Size	Capacity	Motor	Size	Capacity	Motor
No. 1	0 to 1½″	7½ hp	No. 4	½″ to 9″	30 hp
No. 2	0 to 4¾″	15 hp	No. 5	1″ to 7″	75 hp max.
No. 3	½″ to 6″	25 hp	No. 6	1″ to 10″	75 hp max.

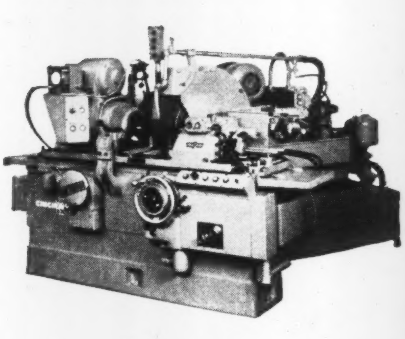
No. 2 size, illustrated above, has widest range of applications. Nos. 5 and 6 sizes are tooled up for specific jobs.



CINCINNATI FILMATIC Chucking Grinders are built in Nos. 1 and 2 sizes, 0 to 4″ and 2″ to 10″ capacity respectively; single spindle or two-spindle headstock. May be equipped for hand loading or for completely automatic operation.

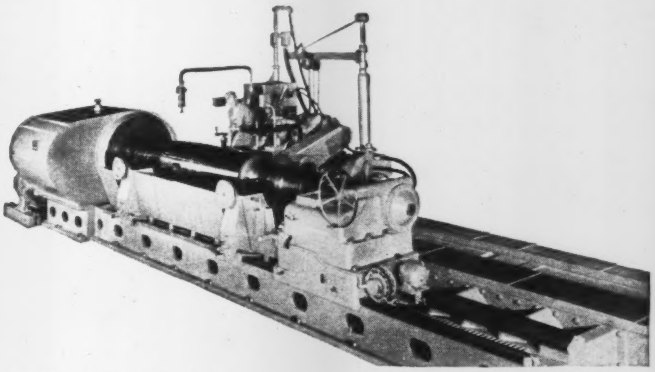


Accuracies within .000025″ round and square with one end, on comparatively short parts, are generated by CINCINNATI FILMATIC Micro-Centric Grinding Machines. Two sizes: No. 1, 3/16″ to 4″ diam. capacity; No. 2, 2″ to 10″ diam. capacity. Manual loading or completely automatic operation.



Automatic grinding wheel balancing and push button automatic infeed are standard equipment for CINCINNATI FILMATIC Angular Wheel Slide Grinding Machines. Several sizes available, with 30° or 45° angular wheel feed.

Size x length | 6″R and 10″L x 18″ or 30″
10″R and 14″L x 18″, 36″, 48″ or 72″



CINCINNATI FILMATIC Roll Grinding Machines are built in two types and several sizes. 1) Traveling table machines: 16″, 20″, 24″ and 28″; medium and heavy duty; lengths up to 192″. 2) Traveling wheelhead machines: 36″, 44″, 50″ and 60″; lengths up to 288″. All have tilting wheelhead cambering units; table (wheelhead) traverse rates are infinitely variable. Automatic grinding wheel balancing available.

W. C. HITT
Asst. Chief, Quality Control,
Douglas Aircraft Co. Inc.,
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WILLIAM D. KIEHLE
X-ray Div., Eastman Kodak Co.,
Rochester, N. Y.

HERBERT H. SCHAFFNER
Manager, Production Gaging Dept.,
Brush Instruments Div., Clevite
Corp., Cleveland

M. F. HASLER
Applied Research Laboratories,
Glendale, Calif.

FORUM ON
TECHNICAL
PROGRESS

Inspection and Testing

More Ultrasonic Tests Needed For Honeycombs and Missiles

—W. C. HITT

During 1958 we will complete work on a unit to inspect metal-to-metal and honeycomb bonding. It incorporates basic ultrasonic equipment coupled through a gating circuit to a memory tube.

We expect to place more emphasis on the nondestructive inspection of purchased components for missiles and aircraft. We feel that the field has been neglected.

Two major projects in nondestructive testing were completed in 1957. The first is the development of equipment which x-rays units in motion. Sixty ft of welds in large body sections of missiles are x-rayed in less than 30 minutes, six times faster than the old method. The quality of the moving film is equivalent to that exposed conventionally.

The second installation is at Douglas Aircraft's receiving department. It inspects raw material quality by magnetic particle, fluorescent penetrant, fluoroscopy, and ultrasonics. An operator rides a carriage at the scanning position of the ultrasonic equipment. Included is a unit which follows the contour of the parts. Testing volume has doubled.

Automatic X-Ray Processing To Aid Radiograph Quality

—WILLIAM D. KIEHLE

The marked trend toward automation in industrial radiography promises to increase the usefulness of this oldest form of nondestructive testing. The last 12 months have seen the development of prototype automatic film processors capable of delivering dry radiographs in 6 to 10 minutes. Production models should be available in 1958. Leading users of radiography are experimenting with individually wrapped films which reduce the labor of examining thin specimens. The device eliminates darkroom loading of cassettes.

The combination of these new techniques plus higher speed x-ray films should greatly increase production in the radiographic laboratory. Controlled processing with less need to handle films should help maintain uniform, high sensitivity in radiographics.

As improved procedures are adopted, additional trained personnel to interpret and fully utilize the radiographic findings will be needed. Many engineering colleges and universities could fill this need by providing basic training in nondestructive testing.

Surface Finish Measurement To Gain Wider Recognition

—HERBERT H. SCHAFFNER

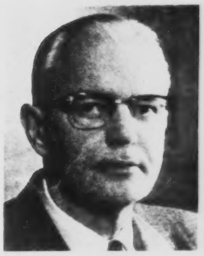
Surface finish is the fourth dimension of a machined piece. By controlling it, the manufacturer can improve wearing properties and reduce the noise level. Widespread interest in accurate measurement and control of surface finishes is a recent development.

Next year should see a broader application of quantitative measurement techniques at the point of production. Users will find instruments more than adequate for the vast majority of their problems. The challenge is in education in application and in the development of specifications rather than new equipment and techniques.

A. J. STEVENS
Vice President, General Manager,
Nuclear Systems, a division of Budd
Co., Philadelphia

WARREN J. McGONNAGLE
Argonne National Laboratory,
Lemont, Ill.

J. E. REIDER
Metals Div. Manager, Industrial
Nucleonics Corp., Columbus, Ohio



PHILIP S. FOGG
Chairman of the Board, Consolidated
Electrodynamics Corp.,
Pasadena, Calif.

Last year more interest was displayed in the standards of the American Standards Association. This year may be the one in which to look for more universal application of proper surface finish measurement.

Improved Instruments Do Fast Steel Analysis

—M. F. HASLER

In 1958, several important developments in the testing and inspection of steel will be available.

In the field of optical emission (spectrochemical testing), look for larger versions of direct-reading, vacuum spectrometers. In 2 minutes they will analyze the carbon, sulfur, arsenic, and phosphorus in steels, plus all the other metallic elements of interest. The steel sample is sparked in an argon atmosphere.

In x-ray spectrochemical analysis, large, multichannel instruments will quickly analyze nonmetallic samples, such as slags, ores, and cements. The same instruments will give more precise analysis of high constituents in specialty steels and jet alloys.

Scintillometers Up Sharpness, Aid Use of Nuclear Sources

—A. J. STEVENS

Iridium 192 and cobalt 60 are being used in increasing quantities almost daily for nondestructive testing of castings, weldments, and assemblies. Cobalt 60 provides a relatively inexpensive tool (its price has been reduced) for the radiography of steel sections up to 12 in. thick. Low initial costs of equipment for gamma radiography, together with the appreciably lower costs of installation, make it particularly appealing for use where high voltage x-ray had been indicated.

Nondestructive testing of large structures with thick sections have produced a need for a logging method to detect flaws not readily discovered by other techniques. The problem appears to have been solved by use of moderate sized cobalt 60 sources, coupled with scintillation equipment. The technique offers considerable promise with thick steel vessels, centrifugal castings, solid propellents in rockets, special refractories, ingots, and billets.

A modified method of scintillation detection of gamma radiation shows considerable promise as an extremely sensitive, stable, and high-speed thickness or density gage for plate rolling mills and pipe mills. Such instruments will be introduced sometime during 1958. Similar equipment utilizing less penetrating radiation for sheets and strip will be available a short while later.

Quantitative Results Needed In Nondestructive Testing

—WARREN J. McGONNAGLE

The past few years have witnessed a rapid growth in nondestructive testing. The demand for and use of such methods will continue to grow at an even more accelerated rate. If we are to continue to make engineering advances, nondestructive testing must find wider application.

Nondestructive testing is still in its infancy. The inspection process must be speeded up and automated.

In general, nondestructive tests results are qualitative. The great need is for quantitative information. The interpretation of defect indications must be more thoroughly investigated. Correlations of test results with performance, service, mechanical properties, and destructive tests must be made on a wider and more complete scale.

Realistic material standards must be established to classify inhomogeneities into harmful and harmless categories—especially in the nuclear energy, jet aircraft, and missile fields.

Rapid Controls for Automation Said To Be Greatest Need

—J. E. REIDER

Process control of a machine requires fighting for fractions of a second. The goal of business control is to obtain information rapidly and obtain speedy action. Called data processing, it is the area in which immediate work must be done by process control system suppliers to keep pace with the needs of the steel industry. It is the area that will afford the most effective means of controlling costs and maintaining profit levels.

Mass Spectrometry Gains In Control of Quality

—PHILIP S. FOGG

The trend toward increasing production of high purity steels, and metals in general, has pointed up the growing importance of mass spectrometry in the steel industry. Most of the purification must be done in high vacuum systems.

The mass spectrometer is one of the few instruments that can analyze

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Machines Inc., Detroit

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Vice President & Sales Manager,
High Voltage Engineering Corp.,
Burlington, Mass.

VINCENT E. LYSAGHT
General Sales Manager, American
Chain & Cable Co. Inc., New York

the gases present in a high vacuum. It has already become an essential tool in vacuum furnace gas monitoring, vacuum-fusion laboratory analysis of metallurgical samples, and monitoring inert welding atmospheres.

Important progress has been made during the year. The mass spectrometer is being used to analyze metal directly. Metal is vaporized by high-intensity spark and the gas fed to the spectrometer. The instrument gives a look into occlusions in metals. It will also detect extremely minute impurities in the alloys themselves.

Mass spectrometers are going to be used to detect extremely minute quantities of metallurgical poisons in some of the rarer metals being used for high strength and low weight, such as titanium and niobium. The strength of such metals depends on purity.

New Ultrasonic Device Checks Thin Sheets

—C. G. McCLURE

These advances will play an important part in the acceptance of ultrasonics: 1. New equipment which determines case hardness depth nondestructively from one surface. (A high test frequency is used to obtain a reflection from the transition zone between the hardened and the unhardened material.) 2. A new instrument which generates extremely short ultrasonic pulses can check front and back surfaces of steel sheets as thin as 0.020 in

The ultrasonic method can provide the high speed inspection required by automation.

The method is being used to check many critical components, and work is proceeding to extend its range. Geometrical shape and composition are present limitations. Special designs are the answer to such problems. Example: A search unit which fits inside a 0.135-in. hole to inspect large artillery guns and the tailshafts of naval vessels.

In step with application advances are investigations into the action of ultrasound in materials. So far information has been obtained on the relationships between attenuation and fatigue, forgeability of steel, phase changes, minute porosity, magnetic properties, internal friction phenomena, and the effects of radiation. Equipment for such research is available and will soon be standard in research labs.

Statistical Controls to Fore, Automatic Tests Trend Cut

—LOUIS A. WELT

We notice less of a trend toward automation than was prevalent several years ago. Statistical quality control seems to be becoming more widespread than ever—automation isn't needed when you can do it on a percentage basis.

We also notice a trend for testing complete parts or pieces as opposed to knocking off a test specimen from exceptionally large work. Several new machines have been built to accommodate such items as 24-in. titanium billets 6 ft long, and gears more than 40 in. in diameter.

Industry Turning To X-Ray To Meet Exacting Standards

—E. ALFRED BURRILL

X-ray inspection methods and equipment designs are being evaluated for versatility, penetrating power, and compactness. New materials, greater section thicknesses, and higher stresses are changing the emphasis on x-ray equipment specifications.

New developments in the visual observation of x-ray images offer possibilities in the production-line inspection of bulky objects where radiography has not been economically practical.

We expect that the need for x-ray education will continue.

Automatic Hardness Tester Becomes Statistical Tool

—VINCENT E. LYSAGHT

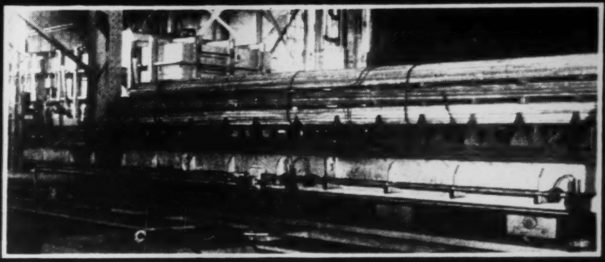
Nondestructive metal hardness testing is coming of age. Mass production demands precision apparatus which will automatically classify workpieces as too soft, too hard, or satisfactory.

Some highly satisfactory equipment is available for automatic hardness testing. More will be introduced in the near future. New concepts in electronic circuitry aid high-speed hardness testing in Rockwell and Brinell classifications.

In production hardness testing, more manufacturers are resorting to statistical methods of quality control. Fully automatic machines which will handle 1000 workpieces an hour have attracted several organizations. They provide accurate data which can be tallied on a control chart and analyzed for hardness quality.

Motorized testers have been greatly improved. As a result, better units for quality testing are available to the small and medium-sized manufacturer.

The microhardness tester is a valu-



A thirty-foot straight bar furnace in operation at Youngstown Sheet and Tube's Briar Hill Plant.

Lee Wilson Merchant Bar Annealing System

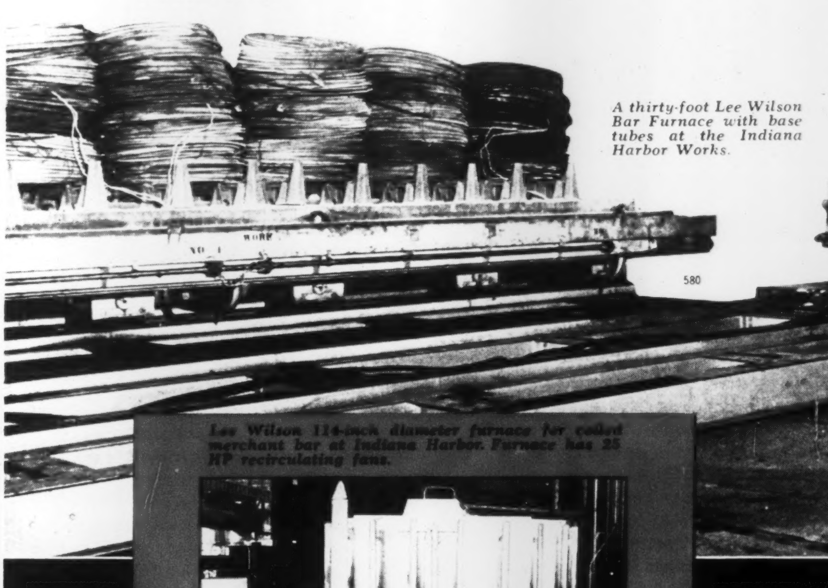
improves properties, finish...reduces costs

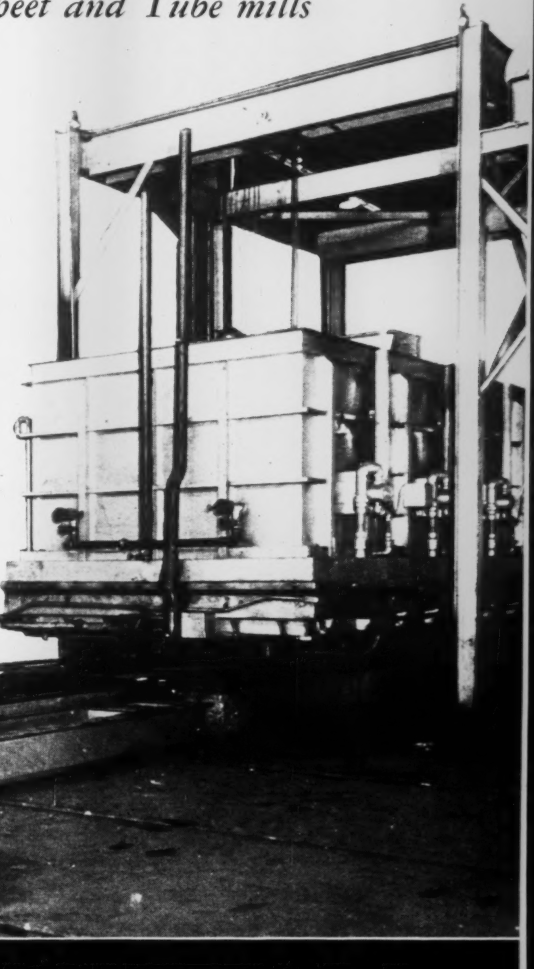
. . . at two Youngstown Sheet and Tube mills

For annealing merchant bar in coils and long straight lengths Youngstown Sheet and Tube found Lee Wilson Radiant Tube Fired, Gas Tight Furnaces deliver the desired results. In both their Youngstown and Indiana Harbor works Sheet and Tube reports the Lee Wilson Furnaces process anneal, spheroidize, and lamellar anneal to uniform physical properties without decarburization.

For charges of either hot rolled and pickled bars or cold drawn material, treatments can be made to combine carbon restoration in the annealing process. Complete control of atmospheres is assured with oil seals between furnace and bases, and uniform contact with the metal with the process atmosphere is developed by the use of internal recirculating fans mounted in the furnace roof.

If annealing merchant bar, wire, rod, strip, or sheet coil—steel, aluminum or brass—is part of your business, Lee Wilson has the furnace to give you better results at reduced costs.





A thirty-foot Lee Wilson Bar Furnace with base tubes at the Indiana Harbor Works.

Lee Wilson 114-inch diameter furnace for coiled merchant bar at Indiana Harbor. Furnace has 25 HP recirculating fans.

Lee Wilson* **ENGINEERING COMPANY, INC.**

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SINGLE-STACK RADIANT TUBE ANNEALING FURNACES

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JOHN C. SMACK
Manager, Ultrasonic Sales, Curtiss-Wright Corp., Caldwell, N. J.

W. A. BLACK
Chief Electrical Engineer, Steel & Tubes Div., Republic Steel Corp., Cleveland

LYMAN R. FINK
General Manager, X-ray Dept., General Electric Co., Milwaukee

able aid. It will find increasing usefulness in testing thin materials, electroplated coatings, decarburization investigations, estimating tensile strength, and controlling case.

The art of testing and accurately determining physical properties at elevated temperatures has been perfected. New units determine the Rockwell hardness of metals at temperatures of 1500 to 1600° F within the shell of a controlled atmosphere gas furnace.

Smaller portable units will attract more users for large workpieces.

Ultrasonics Need Exactness, Automation To Ensure Growth

—J. C. SMACK

Expansion of nondestructive testing will follow the trends of 1957. Ultrasonics will be at the forefront with improved equipment and programs to develop techniques for more exact interpretation of test results. Engineering will be directed toward specific applications.

For example, immersed ultrasonic testing has been of prime importance in testing nuclear fuel elements. Improved designs are needed for higher scanning speeds and improved flaw detection with high speed recording.

Nuclear reactor components will continue to play an important part in ultrasonic immersion technique tests.

Some airframe manufacturers have installed large immersion equipment and can take care of a wide range of ultrasonic tests. The units have tanks as wide as 12 by 90 ft with up to three bridges (on one tank) equipped for simultaneous operation.

Other ultrasonic applications require automation of contact testing to increase coverage and make them economically feasible. A good example: Freight car axles. They require a thorough and reliable test without complicated operator interpretation. Development of a semiautomatic axle test probe (with an electromagnet to hold it to the axle surface), a motor-driven 370-degree scanner, automatic oiler for couplant, and red light crack signaler provides a foolproof test which one operator can apply to hundreds of axles per day. Field tests now underway in modern, electronically operated freight yards are proving the need and acceptance of automation and electronically operated, flaw signalling circuits.

Eddy Current Gets Major Role In Testing of Steel

—W. A. BLACK

To satisfy the demand for better raw materials and quality control, all methods of nondestructive testing have taken on new importance.

There is much interest in eddy current testing. Only recently have organizations such as the Society for Nondestructive Testing felt it warranted a prominent place on their programs.

At the National Metal Congress in Chicago a Forster circuit demonstrated automatic separation of defective ball races. Rejection was for inadequate hardness, not discontinuities. It is an example of how devices developed originally for the detection of defects or discontinuities are being broadened to include measurement of physical properties.

Eddy current testing has been applied to metal tubing. The methods induce a circumferential current in the tube. Analysis of the electrical changes in a pickup or detector coil establishes the presence of defects. Difficulties depend on whether the tube is magnetic or nonmagnetic.

Other tests developed in the last two or three years have been confined to nonmagnetic tubing with widely varying degrees of success.

The future of eddy current testing in steel probably lies in the fields of billet, bar, tube, and pipe testing. Applications for cold-drawn bars, small, hot-rolled bars, tubing, and pipe will probably use surrounding coils which will test homogeneity. Eddy current methods for billets and large, hot-rolled bars will be concerned with surface conditions only. For internal conditions, an ultrasonic test will be added.

Cites Several Improvements In X-Ray Equipment

—LYMAN R. FINK

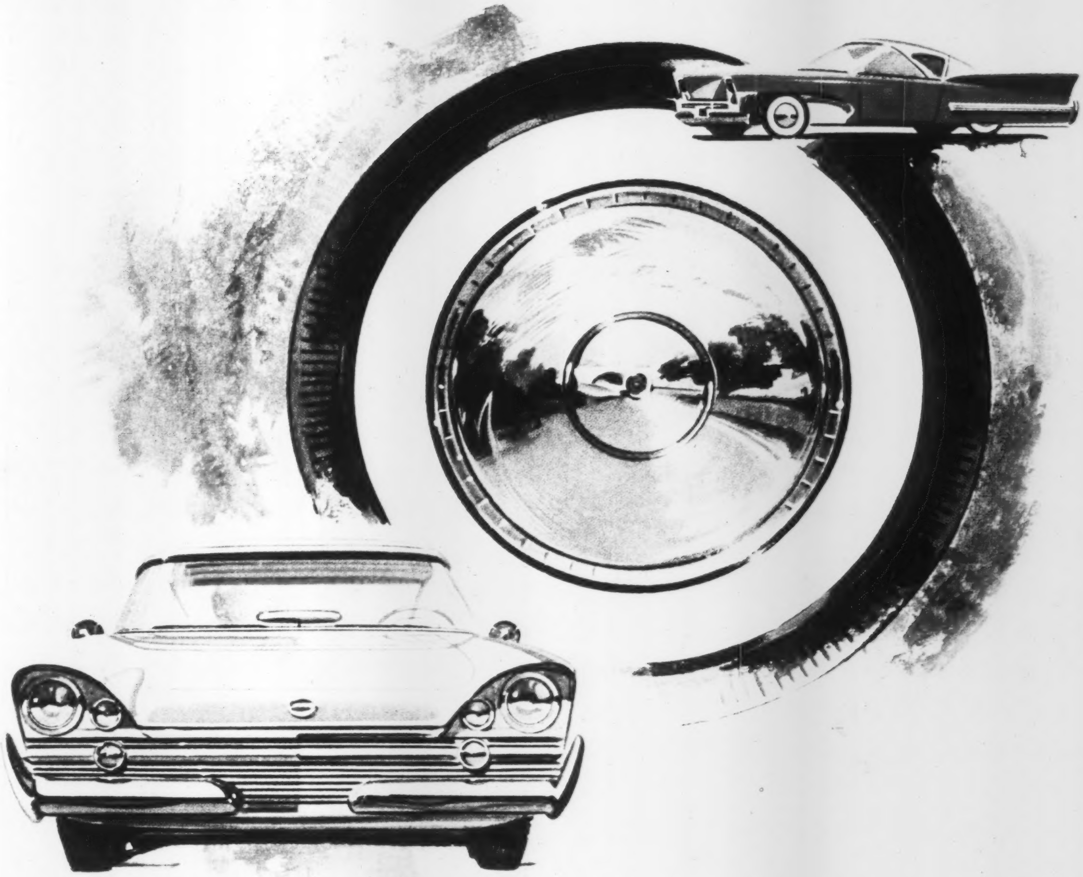
Built-in protection that reduces the need for costly leadroom shielding will become standard. The trend has favored lightweight, portable design; in the future, shielding will be favored.

Available equipment offers a striking gain in image brightness. Remote viewing is an optional feature. Products need no longer be fluoroscoped. Brightness can enhance the visibility of flaws in many products. In time, detail will approach that of radiography.

The structure and phase of metals are becoming increasingly important for special applications. You can expect to hear of impurities, alloy dispersion, phases, and molecular configurations that are unknown today.

A new trend is the routine and precise determination of alloying ingredients in steels and other metals prior to casting. It insures uniformity of content from melt to melt and the absence of unknown ingredients. After basic standards are set by classical chemistry methods, x-ray spectrometry provides routine quality control in a matter of minutes.

Computer-linked 250-kv installation at a midwestern ordnance plant obtains data by spiraling rockets through a multiple-station x-ray detector. Results are interpreted against a standard. If a rocket fails to meet specifications, a mechanism puts a



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WALTER S. BAIRD
Chairman, Baird-Atomic Inc.,
Cambridge, Mass.

coded signal on its casing. A system being studied uses miniature roll-film with photofluorography on a 100 per cent basis.

The airlines have pioneered maintenance inspection by x-ray. The same principle (periodic inspection without disassembly) will be applied to other fields.

Applications of x-ray diffraction to metallurgical problems are almost unlimited. They include: 1. Identification of phases present in complex alloys. 2. Quantitative analysis of one phase in a multiphase system. 3. Nondestructive determination of residual stress.

The dry, re-usable electrostatic plates (called xeroradiographic plates) promise to cut processing costs in large volume applications. Because the technique has wide latitude for different densities with one exposure (consequently greater detail), it opens new vistas for quality control.

Control Lab of Future Will Have New Look

—WALTER S. BAIRD

Metallurgical requirements will necessitate control of impurities and gases at levels not reached by conventional methods. Instrumentation, with time cycles of a few minutes, will be required to do work that now takes hours.

Electronic and optical instrumentation will remove the beaker from the laboratory. Control laboratories will be designed without glassware, hoods, or the familiar working bench.

Such instrumentation will speed up production, increase quality, and keep both capital and operating costs to a minimum.

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lubricates 24
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and 40 gears on
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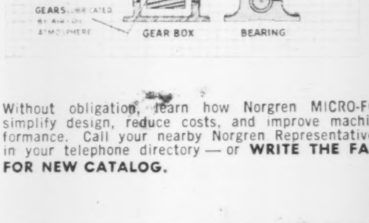
One Norgren MICRO-FOG Lubricator automatically coats all the gears and universal joints on the Moline Drilling Machine, above, with a continuous protective film of fresh oil. Just the right amount of oil—⅓ oz. per hour—no more, no less—is applied to provide the most efficient lubrication, holding machine wear to a minimum.

What Is Norgren MICRO-FOG?

Norgren MICRO-FOG is an air-borne suspension of extremely small oil particles (.00007874" or less in diameter). Because the oil particles are so small, they can be conveyed long distances through complex piping systems without reclassifying and flooding the lines with oil—a condition formerly not possible with conventional oil-fog systems.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Now—MICRO-FOG for 32, 100, 200, 300, 1000 Bearing-inch Requirements

The MICRO-FOG Lubricator on the Moline Drilling Machine, above, has the capacity to lubricate up to 200 bearing-inches. Other MICRO-FOG Units are available with lubricating capacities of 32, 100, 300 and 1000 bearing-inches—the most complete line of aerosol lubricators. This wide range of lubricating capacities means that you can select a Norgren lubricator with exactly the right capacity for the most efficient, complete, machine lubrication.

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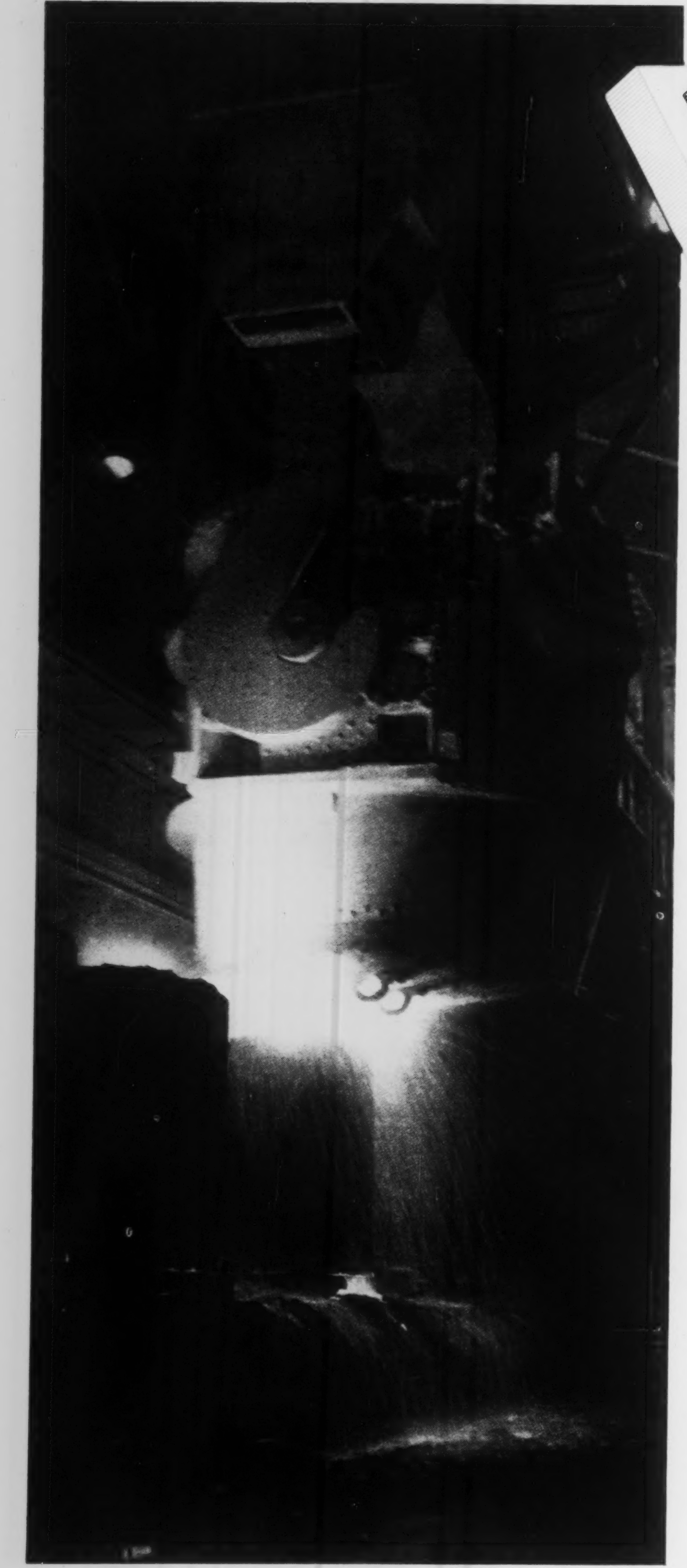

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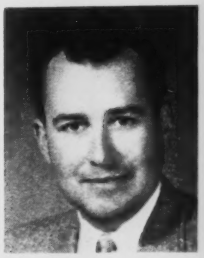


ROBERT O. GEE
Manager of Application Engineering, Reliance Electric & Engineering Co., Cleveland

FORUM ON TECHNICAL PROGRESS

Drives and Controls

Greater Loads, Higher Speeds Ahead for Chain Belt Drives

—BRINTON WELSER

Because of their broad range of capacities, their positive action, compactness, flexibility, and ease of adaptation, chain drives provide a major portion of mechanical power transmission.

Improved materials and manufacturing methods plus advances in design have produced better equipment, enabling chain drives to carry greater loads and operate at higher speeds.

Antifriction bearings have been undergoing improvements. Increased precision, greater bearing capacity (both radial and thrust), and an accompanying reduction of noise prolong the production accuracy of the equipment using such bearings.

Batteries Find Greater Use In Mill Electronic Controls

—M. W. HEINRITZ

The increased use of electronic equipment in the steel industry is resulting in more applications for industrial batteries than ever before. The new stationary batteries now being supplied in plastic containers by all principal manufacturers are to be found as an integral part of control devices.

In the batteries used for electrically propelled, material handling fork and ram trucks throughout the mills, there is a marked demand for higher capacity to space ratios.

Dependability of operation and cost per unit of operating time are becoming more important in the use of battery-propelled fork trucks in their important role of integrating production lines.

Torque Converter Drives Replace Geared Transmissions

—JOHN H. BATTEN

The torque converter received its greatest impetus in the industrial field when Detroit adopted the hydraulic drive as a major component of automatic transmissions for passenger cars. The application demonstrated its benefits to the operator of industrial equipment.

Torque converters are now used to a large extent in transmission systems for material handling equipment.

The earthmoving equipment industry has also adopted the torque converter. The extensive road building program now in progress will require much of this type equipment.

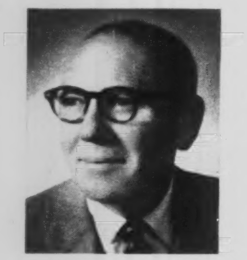
Another industry has started to feature the torque converter in a major engineering change: One of the prime manufacturers of farm tractors recently announced the availability of a torque converter drive.

Rebuilds, Central Controls Mark Machine Drive Progress

—ROBERT O. GEE

The trend toward more automatic operations poses a problem for the average manufacturer: How to stay competitive with his present machinery.

Many of the nation's producers are turning to rebuilds to keep them in the production race. Often a new drive arrangement, with control designed for programming or continuous processing, and a few mechanical modifications will upgrade an



JOHN C. SEARS
Executive Secretary, American Gear Manufacturers Assn., Washington

E. H. BROWNING
Manager, Metal Working Section, Industry Engineering Dept., Westinghouse Electric Corp., East Pittsburgh, Pa.

J. M. COOK
Sales Manager, Industrial Control Div., Cutler-Hammer Inc., Milwaukee

J. E. OTIS JR.
President, Dodge Mfg. Corp., Mishawaka, Ind.

older machine to approach or meet today's performance standards at relatively low cost.

Increased automation brings with it a need for more instrumentation of all types. Centrally located controls permit one operator to control and observe the performance of several machine operations simultaneously.

Some processes must be completely automated to rule out human error. An example of such a plant is an electronically controlled, resistance-weld pipe mill in western Canada.

Once the mill is set up, one man can operate it from a single control console; no one touches the material from the time it is brought into the entry section as raw skelp until it emerges as finished, end-faced pipe ready for shipment.

Redesigned Gear Trains Run Quieter, Have Greater Power

—JOHN C. SEARS

Gear manufacturers, particularly those that supply aircraft, rocket, and missile gearing, are investing large sums of engineering time and money in research and development. Many advances made in the fine pitch field are being carried over to the heavier pitches and heavier loaded gearing.

New inspection, checking, and gaging equipment more accurately measure tolerances being achieved by the gear cutters.

Enclosed drive manufacturers, by frequent redesign toward more functional housings, mountings, and gear train arrangements, are meeting the demand for quieter performance and higher horsepower through smaller gear sets.

The gear industry, through its trade association (AGMA) continues its effort to create and maintain engineering standards that benefit all gear users.

Blast Furnace Charging Automatically Programmed

—E. H. BROWNING

Many new forms of automatic electrical controls came into use in the steel industry last year.

This year will see continuing expansion in the use of more advanced systems which are aimed at increasing the productivity of metal rolling and processing operations.

Automatic card programmed controls will be used extensively in the steel and aluminum industries this year, serving as outstanding adjuncts to highly developed adjustable voltage drive systems. Digital computing type controls, making extensive use of transistors, will prove their value.

Static magnetic switching devices will assume a position of prominence in steel mill operations. Large scale applications are being placed in service to control the automatic programming of blast furnace charging operations.

Improved Drives and Controls Reflected in Product Quality

—J. M. COOK

Technological advancement is continuing at a high level. New techniques, components, and entire systems are being developed to provide industry with drives and controls it will need for improved manufacturing processes.

Improved instrumentation has greatly widened the scope of quantities that can be accurately measured continuously. It has provided the control and drive designer with many new tools which he can incorporate into his control system.

By accurately controlling measured quantities, it is possible for drives to greatly improve the quality and uniformity of the products produced by the driven machines. It is in this field of improved product quantity that the biggest earnings will be realized from improved drive and control systems.

Increased complexity of drive systems and the wide range of technical fields now encountered in the systems have greatly expanded the skill requirements of the drive designer. The assignment of a single responsibility for the entire drive system is not far off.

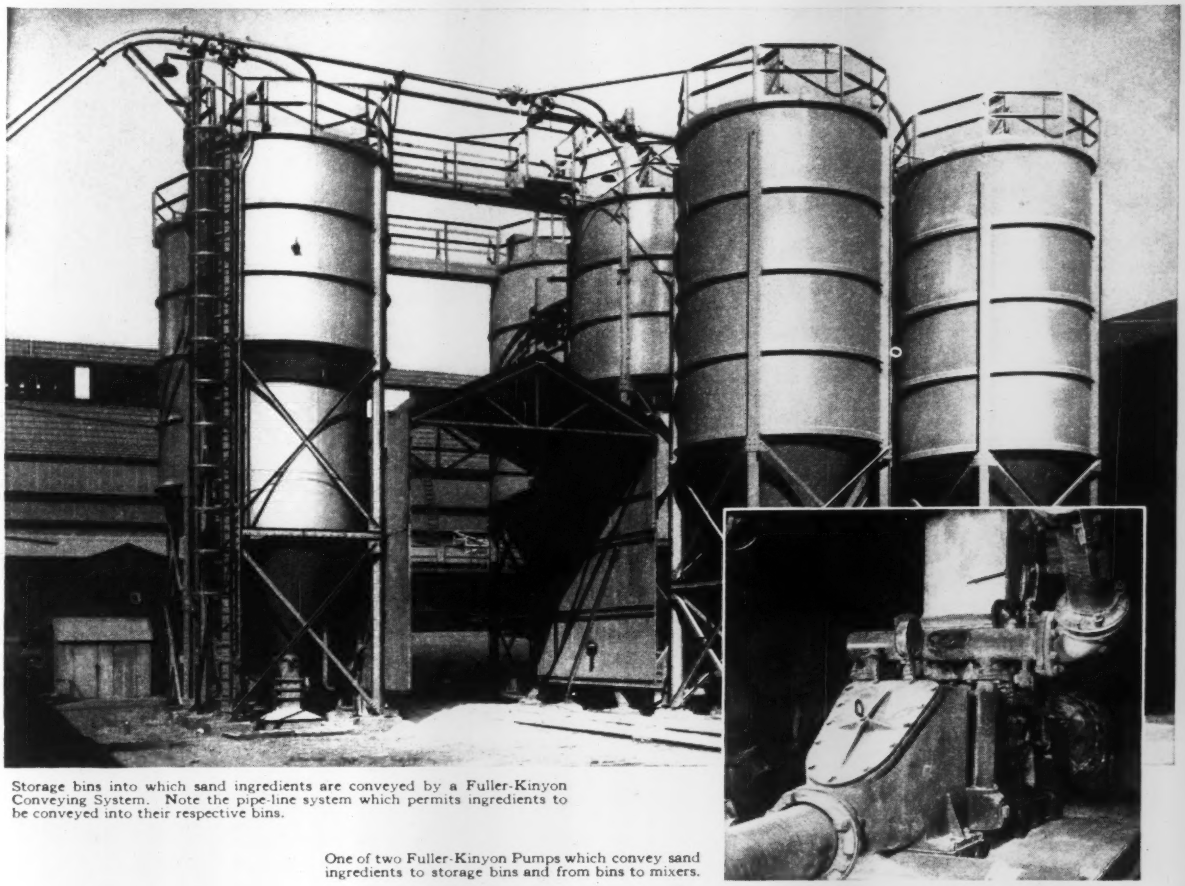
New Drives and Controls Easier To Install, Maintain

—J. E. OTIS JR.

Drives and controls of the future will be designed for greater horsepower output, improved product appearance, and simplified provision for installation and minimum maintenance.

New drives and couplings are revolutionary in design, yet based on proved engineering principles. A new flexible cushion shaft coupling, for example, employs a rubber tire element to compensate for shaft misalignment, absorb end float, and diminish torsional vibration.

Many plants are finding a simple solution for tough drive problems in dry-fluid drives and couplings, which provide the equivalent of no-load



Storage bins into which sand ingredients are conveyed by a Fuller-Kinyon Conveying System. Note the pipe-line system which permits ingredients to be conveyed into their respective bins.

One of two Fuller-Kinyon Pumps which convey sand ingredients to storage bins and from bins to mixers.

FULLER-KINYON CONVEYING SYSTEM HANDLES THREE DIFFERENT MATERIALS EFFICIENTLY, WITHOUT WASTE

To reduce costs and speed up handling of foundry sand ingredients with minimum waste, General Steel Castings Corporation, Granite City, Illinois, installed a Fuller-Kinyon Conveying System.

Here's what it does for them—

The system unloads corn flour, silica flour and bentonite from hopper bottom cars by means of Fuller-Kinyon Pumps which convey these materials through pipe lines to a number of storage bins. The flexibility of the system makes it possible to unload cars in a fraction of the time that would be required manually, *and*, waste due to spillage is eliminated. Two pumps used in the operation can be moved on narrow gage tracks for spotting under cars or bins. One pump is used mainly for unloading and delivery to storage—the other for delivery from storage to supply bins above the mixers. However, it is possible to unload cars and reclaim from storage simultaneously. Where bins are located so that they cannot discharge directly to a pump, an F-H Airslide® conveys from bins to the pump.

Prior to the Fuller installation, material was received in bags and manually unloaded, stored and transported to the mixers. It figures—*costs were much higher*. Now, waste has been eliminated! Another important feature—the company has realized extra savings by purchasing materials in bulk.

Fuller air-conveying systems are in operation in hundreds of plants throughout industry, cutting costs and increasing profits, day in and day out. The next time you have a materials-handling problem, why not get in touch with Fuller . . . chances are you will also profit.

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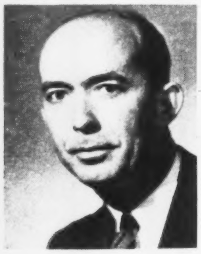
P. D. ROSS
Manager, Marketing, Direct-Current Motor & Generator Dept., General Electric Co., Erie, Pa.

W. H. BENNETT
President, Hydraulic Press Mfg. Co., Mt. Gilead, Ohio



T. H. BLOODWORTH
Supervisory Engineer, Electrical Application Dept., Industrial Equipment Div., Allis-Chalmers Mfg. Co., Milwaukee

starting plus overload protection. Smooth starts tend to prevent breakage and reduce maintenance on motors, gears, bearings, and driven machinery. Starting torque can be tailored to driven load requirements by varying the flow charge, which consists of heat-treated steel shot.

Here again the trend toward higher horsepower is reflected in the demand for larger sizes of dry fluid drives and couplings.

Evidence of this trend is seen in the growing use of shaft-mounted speed reducers, which require no foundation, flexible coupling, or motor rails for belt take-up. As these become available in larger sizes, many manufacturers are using them for heavier drive units on their equipment.

Increasing use of tapered bushings for the mounting of wheels on shafts is another indication of industry's insistence upon simplicity plus efficiency. This type of mounting is fast becoming the standard for quick and easy installation of such components as conveyor pulleys, V-belt sheaves, sprockets, and many kinds of couplings, including the new flexible cushion type.

Cheaper Fuel, Better Metals Needed for Gas Turbine Use

—FRANK H. FORD

Progress in the gas turbine industry depends on advances in metallurgy and fuel treatment processes.

One of the main limitations on gas turbines is the operating temperatures that metals must withstand. As soon as the hurdle is overcome, the turbine will find greater application.

Steps have been taken toward burning of Bunker C as a gas turbine fuel; but it is not a complete solution. All turbine manufacturers are considering the problem; they believe that once fuels of this type can be used gas turbines will be highly attractive.

Considerable work has been done in the development of combustion chambers which isolate the high temperature combustion from the atmosphere by surrounding the chamber with air ducts containing incoming cool air.

Gas turbines have found some application in many fields; the pipeline and power generation industries have the most installations.

There is more opportunity for gas turbine usage by refineries. For example, small pump drives are being used on petroleum product lines.

Motor Driven Table Rolls Eliminate Costly Shutdowns

—P. D. ROSS

This year will see more steel mills converting to individual drive motors on rolls of live reversing tables. Increased reliability and dependability are behind the trend, made possible by the development of slow speed motors in standardized AISE 600 frame sizes.

In the past, hot metal rolling mill practice on large reversing tables for blooming mills, slabbing mills, plate mills, and reversing roughers has been to use lineshaft gearing from a single motor drive to a large number of table rolls. High peak torques on reversing cause rapid wear of gearing. This creates high maintenance costs. A gear failure will shut down the mill.

Gearing is eliminated by applying slow speed motors to individual rolls. Rugged auxiliary mill motors can withstand the high peak torques without damage or excessive wear.

Successful installations to date indicate substantial reduction in maintenance expense. Unscheduled shutdowns are virtually eliminated since the loss of one roll as the result of motor failure will not shut down the mill.

Changing Production Processes Requires Constant Improvement

—W. H. BENNETT

Constant modification of standard lines is necessary to keep pace with changing manufacturing procedures. New machines and faster operation alone are not the answer; quality and control of manufacturing tolerances are more important than ever.

Cost, always an important factor, dictates the design and the process so that the user can make his product with costs that will permit him to sell at a profit.

Programming, Gage Control Will Be Part of New Mills

—T. H. BLOODWORTH

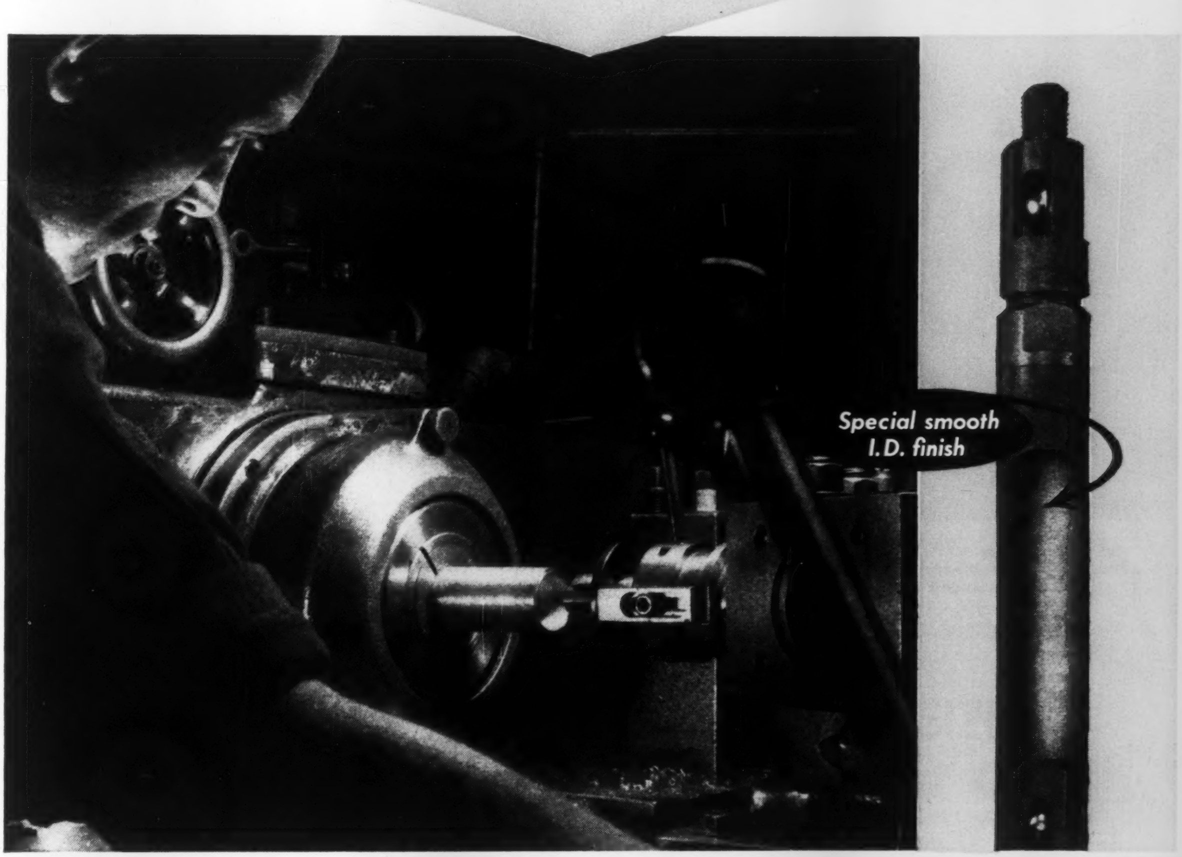
The trend to greater utilization of automatic control in steelmaking processes will continue.

Reversing hot mills will be more fully programmed than ever before. Blooming mill functions, including co-ordinated operations of mill, tables, sideguards, and manipulators, will be controlled by punched cards.

Tomorrow's controls will add provisions for checking ingot temperatures and automatic modifications of the punched card program to com-

This pump manufacturer reports 25% savings with

J&L COLD DRAWN ELECTRICWELD TUBING



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This manufacturer of oil well insert pumps reports a saving of 25% by converting from honed seamless tubing to *cold drawn* special smooth I.D. Electricweld tubing. Not a single tube failure has been reported from the field.

Because of its superior inside surface finish, exact tolerances and closely controlled physical characteristics, J&L *cold drawn* Electricweld tubing is recommended for these applications:

- *cylinder tubing* • *shock absorbers*
- *ordnance parts* • *hydraulic and pressure tubing*

J&L *cold drawn* Electricweld tubing is readily available in diameters from ¾" O.D. to 4¼" O.D., 8 gage to 20 gage, and can be furnished to closer than commercial tolerances. Write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pa.

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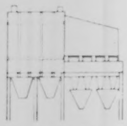

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President, Denison Engineering Div., American Brake Shoe Co., Columbus, Ohio

pensate for temperature variations.

Automatic gage control will be developed for hot strip finishing mills that regulates thickness and holds width to closer tolerances than are feasible today. In the future you can expect program control from punched cards, forwarded with orders.

Automatic gage control will be supplied on all new tandem cold reduction mills. Present mills will be modified to include that control. Programming will be added, to preset control functions. Readout devices will provide information on variations in gage of the finished coil.

Static power supplies, with silicon or germanium rectifiers, will find increasing acceptance for variable voltage power supplies in processing lines. Mercury arc rectifiers will be used for such reversing applications as flying shears for rod mills where rapid acceleration and deceleration and accurately controlled stopping are mandatory.

Developments in Hydraulics Will Cut Operating Costs

—W. C. DENISON

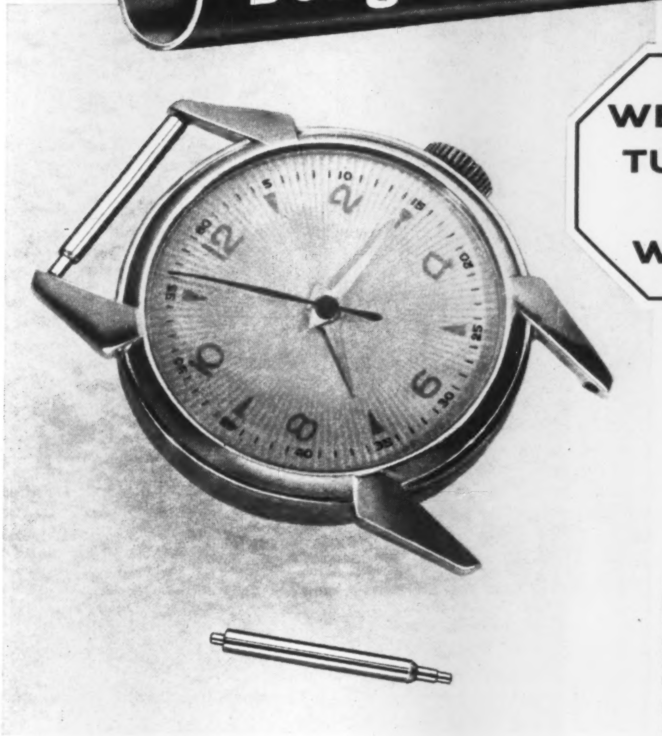
Developments in hydraulics will bring about greater efficiency in production and reduce operating costs.

The hydraulic press is finding increasing application in all phases of industry. It speeds mass production, saving time and labor costs. Its tooling versatility makes production line automation possible.

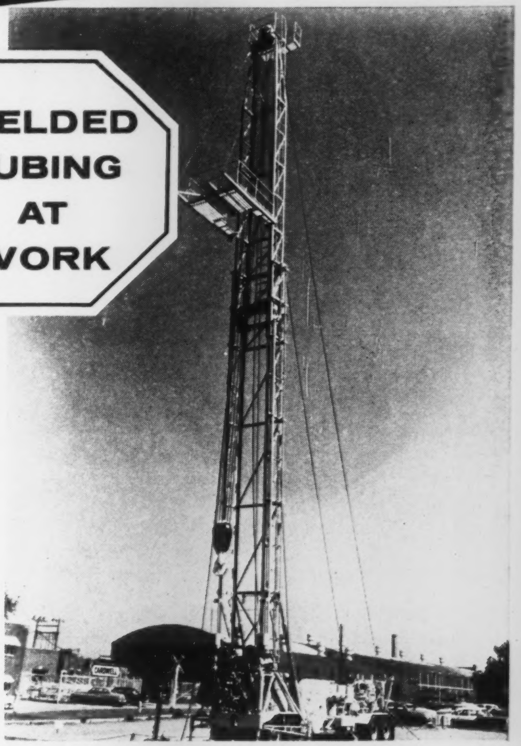
Hydraulic components give engineers a key to the simplification of many operations. They are being used in such widely separated areas as product assembly, drilling wells, the construction of buildings and roads, and mining coal.

Design with TUBING in mind!

WELDED TUBING AT WORK



Accuracy suitable for telescoping, strength for a vital service, corrosion-resistance to withstand body acids—all recommend Welded Stainless Steel Tubing for this tiny watch pin.



Great structural strength, lightweight for mobility, uniformity for inter-working parts—all recommend Welded Carbon Steel Tubing for this oil country drilling rig.

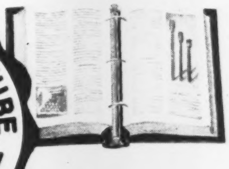
For maximum strength • minimum weight

CHOOSE WELDED TUBING IN ANY SIZE

Carbon • Alloy • Stainless Steel

The tubular form is one of engineering's most efficient sections—and Welded Tubing with greater uniformity about its axes is tubing at its best. Whether you have design requirements for great strength, light weight, high RPM, interchangeability of components, heat, pressure or corrosion—there is a size and grade of Welded Tubing to do your job best. For all tubing applications, consult a quality tubing producer.

An Association of Quality Tube Producers



Design inspiration for you

The 260-page Handbook of Welded Steel Tubing contains inspiration and data for tubing designs. For your copy, write on your company letterhead, giving your title.

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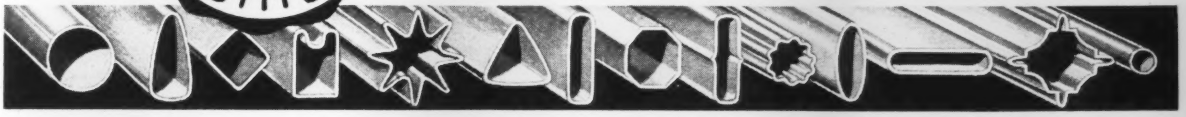
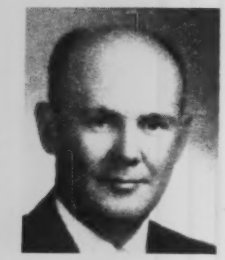
850 HANNA BUILDING • CLEVELAND, OHIO





RALPH J. KRAUT
President, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

H. C. DAUM
Manager, Machining Process Dept., Ford Motor Co., Dearborn, Mich.

J. H. FAMME
Assistant Chief Engineer, Convair Div., General Dynamics Corp., San Diego, Calif.

HENRY D. SHARPE JR.
President, Brown & Sharpe Mfg. Co., Providence, R. I.

FORUM ON
TECHNICAL
PROGRESS

Machining

Look for Tape Control On Diesinking

—RALPH J. KRAUT

Missile manufacturers are using and considering some machines requiring numerical control. They are likely to be of the rotating type, such as large lathes or vertical boring mills, since missiles use components of circular form.

The next large field for the evaluation of numerical path control systems will be die sinking. Forging dies are likely to be the first applications since they start with mathematical definition, and a large number are used on armament work. With the help of the armed services, evaluation projects should appear soon.

Automotive dies present a problem: Three-dimensional shapes represented only by models and graphic description must be converted to numerical data for transfer to tape storage. Some additional techniques to resolve this translation, or a new approach to automobile design, will be necessary before numerical control is advantageous in this field.

Drilling and boring machines probably will provide an extremely fertile field for positioning. The big impetus will be the elimination of jigs and fixtures.

Building Block Concept Aids Builders, Users

—H. C. DAUM

Production machine tools constructed from interchangeable components and units will continue to be a basic requirement of high volume automated lines and lower volume, production lines. Basic building-block components and units having mounting patterns made to dimensional standards will be developed in cooperation with the machine tool industry.

Dimensional standards being advocated will not restrict the machine tool builder in designing production machines for the metalworking industry—nor will they limit the art of machine design or mechanical engineering.

The building-block program could well prove to be a boon to the machine tool industry. Many manufacturers are reluctant to buy new machine tools because of the cost associated with premature obsolescence. These manufacturers would soon be in the market for new equipment if assurance could be given that the machines purchased would have a reasonable life expectancy.

Breakthroughs Needed In Aircraft Production

—J. H. FAMME

Supersonic airplanes and missiles require increasing amounts of steel at strength levels in the 260,000-psi range. High strength titanium is also in the picture. Both requirements add up to machining difficulties. In some operations, you can count the revolutions of the cutters. If cutting is speeded up, chip temperatures can be as high as 2000° F. Tool life is coreespondingly low.

Manufacturing techniques account for the major portion of cost in an aircraft design. The problems ahead of us in metal removal suggest a real good look at fundamentals. Perhaps a chemist and thermodynamics expert could help in finding a better coolant. Intensive work with ceramic or synthetic cutters might be the

JEROME A. RATERMAN
Board Chairman & President, Monarch Machine Tool Co., Sidney, Ohio

MARVIN R. ANDERSON
President, Michigan Tool Co., Detroit

N. M. FORSYTHE
Vice President & General Manager, National Automatic Tool Co. Inc., Richmond, Ind.

WALTER K. BAILEY
President, Warner & Swasey Co., Cleveland

answer. Preliminary tests of ceramic cutters by Convair show encouraging results. Electrical methods of metal removal are another possibility. Important contributions can be made by the chemical etching process. Undoubtedly, there are many other approaches. One thing is certain. There must be intensified effort.

Millionths Practical Limits With Machines Seen for '58

—HENRY D. SHARPE JR.

Fabulous demands have been made on the fits between pistons and cylinders used in hydraulic control valves. Leakage limitations and reliability of operation require small, precisely controlled clearances in servomechanisms and guided missile systems.

In 1958, I expect to see cylindrical grinding machines grinding small pistons to desired size within plus or minus 10 millionths of an inch. These machines will be instrumented so a cylinder may be mounted on an electronic hole gage and the machine controlled to grind a piston which, with that specific cylinder, will have a radial clearance within plus or minus 20 millionths of an inch of desired value.

Variable Speeds Needed For Complex Shapes

—J. A. RATERMAN

Urgent defense and military needs require machine tools of extreme accuracy and flexibility. Missile and rocket component manufacturing, for example, has already taxed the resourcefulness of the entire metalworking industry. It is not uncommon in this field to contour turn a part up to 60 in. in diameter with a wall thickness of only 0.076 to 0.087 in.

The complex shape of these parts demands that the machine tools be specially designed and be equipped with a wide range of variable spindle speeds and other features. Metal removal capacity is also of paramount importance.

Current machining problems stem mainly from the necessity of obtaining greater accuracy in volume production than was formerly considered practical or even possible with standard shop practice.

Emphasis Is on New Processes In Research on Machines

—MARVIN R. ANDERSON

Machine tool development will continue to aim at simpler controls and greater rigidity. They are basic for automation and the higher speeds and feeds now accepted as normal.

There also is heavy emphasis on basic research and development into such things as the physics of machining, metallurgical behavior, machinability, and new tool materials. Out of these studies should come new processes that contribute to more economical and higher quality production. An example of what to expect is the new method of gear forming by displacement of metal.

There will be continuing emphasis on more automatic progressive assembly operations.

Gears and equipment to produce them are getting both bigger and smaller. Missiles and rockets call for smaller gears. Atomic-powered transmission systems need bigger ones. Both have one thing in common—higher precision.

Automatic Machines Tailored for Small Plants

—N. M. FORSYTHE

Sales of machine tools for expansion are down. But higher labor costs and reduced profit margins in most manufacturing industries require still greater emphasis on cost reduction. We believe it is creating a demand for more efficient machine tools.

The trend in automatic machining is toward versatility. The knowhow acquired by machine tool manufacturers in designing and building special purpose machines for large plants is being adapted to machines for small plants. Requirements call for a greater degree of versatility to be incorporated into the machine.

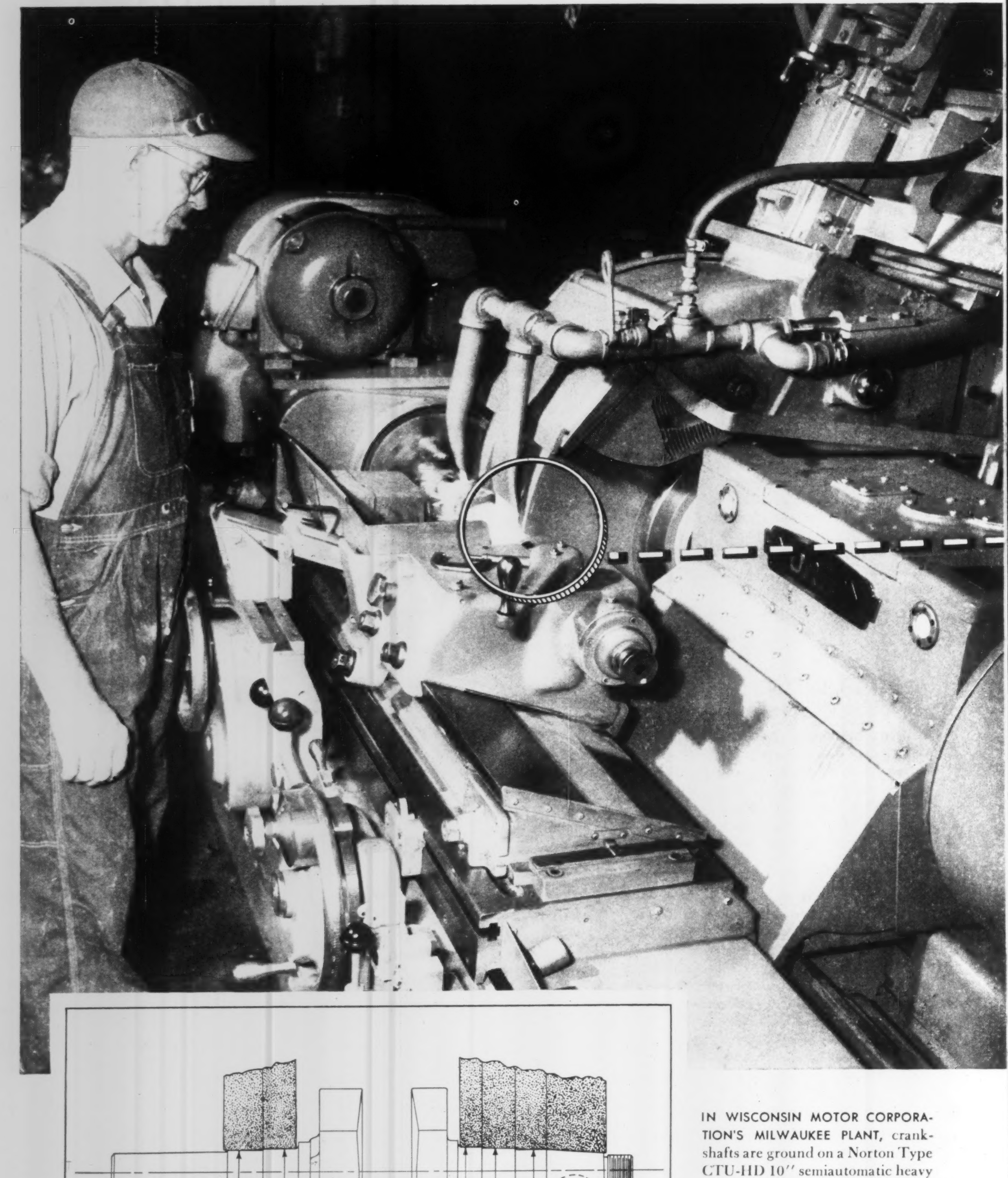
Tape and Contour Controls Will Assist Short Lots

—WALTER K. BAILEY

In small lot production, the problems of size control and changeover or setup time dominate. Size control can be taken care of by making the cycle of the machine automatic. To reduce changeover time and, in effect, to put brains into the machine, recorded information control can be employed. It may be on tape, punched cards, or similar equipment, but the current trend seems to be toward prepunched tape.

With recorded information, the trend will be away from a multiplic-

(Please turn to Page 324)


1.240
1.245
1.3145
1.3135
1.376
1.375
1.3145
1.3135
1.250
1.249

IN WISCONSIN MOTOR CORPORATION'S MILWAUKEE PLANT, crankshafts are ground on a Norton Type CTU-HD 10″ semiautomatic heavy duty cylindrical grinder for approximately half what this job formerly cost. Diagram shows six simultaneous grinding operations: two diameters by wheel on left, three diameters and taper by wheel on right.

The "WISCONSIN STORY"...

Wisconsin Motor Corporation, leading manufacturers of heavy duty air-cooled engines, reports:

Grinding Costs Cut 50%

with this Norton Heavy Duty Grinder

Type CTU-HD machine in Milwaukee plant grinds crankshafts faster and better — at one-half previous cost!

Wisconsin Motor Corporation's endorsement of the Norton Type CTU-HD cylindrical grinder is echoed throughout industry. In plenty of other modern plants this highly advanced, heavy duty machine is doing an outstanding job of boosting production rates and profit margins.

A single 10" Type CTU-HD — or 14" Type LCTU-HD, with increased swing — replaces several separate old-type grinders. It accommodates multiple wheels widely spaced, making it ideal for many plunge cut operations. Or it will take large diameter wheels, essential on such jobs as grinding crankshaft bearings, in order to permit adequate wheel wear before interference with parts of the work.

Semiautomatic or Plain

The semiautomatic arrangement provides an adjustable, automatic grinding cycle under one-lever control. The operator merely loads and unloads, and so can handle more than one machine. Except for this feature the plain machine is identical, and both machines are arranged for fast traverse grinding.

Simplified Operation and Maintenance

All controls for feeds and speeds are set in front of machine. Wheel feed is by a precise revolving screw mechanism with click-count index, by which settings for .0001" in work diameter reduction can be made instantly, without visual check. Controls of work rotation and coolant flow are automatic. Pumps, motors, filters, relief valves, ways lubricant control valves are all outside, for easy maintenance.

For Complete Details

see your Norton Representative or write us direct. And remember: only Norton offers you such long experience in both grinding machines and wheels — your assurance of the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

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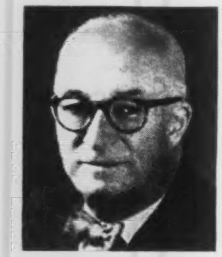


HENRY P. CHAPLIN
President & Treasurer, Cone Automatic Machine Co. Inc., Windsor, Vt.

G. H. JOHNSON
President, Gisholt Machine Co., Madison, Wis.

HOWARD N. MAYNARD
President, Snyder Tool & Engineering Co., Detroit

ity of tools and back to a single tool. Application of contour following, where a single tool follows a template, will become more widespread. However, the template may eventually be done away with and the information fed to the tool by tape or cards.

There is also a definite trend toward automatic loading and unloading. Here, however, the problem is much more difficult than with high production installation. The piece for one setup may be of a totally different configuration than the piece to be run in the next setup.

One major development, common to both the high production and small lot machines, is the continued research on new cutting tool materials which will remove more metal faster and with long cutting life. These tools, including ceramics, should point the way to many new machines designed for higher speeds, more horsepower, and greater rigidity.

Tooth Surface Quality Boosted by Honing

—WALTER S. PRAEG

Gear tooth honing, a hard gear finishing process, is being widely applied to gear production lines. It has demonstrated ability to reduce operating sound levels by removing nicks and burrs, correcting small heat treatment errors, and improving tooth surface finish.

Preliminary research indicates that honing may provide high-performance characteristics for ship propulsion gearing because of the excellent tooth surface finish that can be produced.

Full automation of gear shaving departments continues to be the trend in high-production plants. One automated department has a battery of four shaving machines that finish the teeth on both gears of an automatic transmission cluster. Automatic loaders and automatic inprocess gages that check all gears and also divert and classify rejects are important components of such departments.

Cost of Running Automatics Cut by Quick-Change Tools

—HENRY P. CHAPLIN

The use of quick-change, preset toolholders on multiple-spindle automatics is a good example of improved machining practice. For years, the cost of downtime for tool sharpening and replacement with the conventional toolholders has been prohibitive; the user has often tolerated dull tools until the end of an 8-hour shift. In so doing, higher costs have been added to tool and machine life; a larger number of rejects and poor quality work have resulted.

Surveys and the development of other factors that make up the conditions of machining performance are proving worthwhile. Additional improvements may be expected.

Equipment Review Forced By High Costs, Competition

—G. H. JOHNSON

Rising costs, lower profits, and increased competition will provide incentive for a critical re-examination of equipment replacement policies. More attention will be given to the cost-cutting potentials of standard, general purpose machines compared with similar units 10, 15, or 20 years old. Interest in all forms of automatic equipment and laborsaving devices will intensify.

The outlook for the machine tool builder is tough—but a challenge. He will be required to spend more for research and development. New features to meet the customer's more rigid requirements are needed. Tape, electronic and hydraulically controlled equipment must be perfected and the resultant costs pared so more manufacturers can afford to take advantage of these new production methods.

One new development is a simple hydraulic drive unit which provides a completely automatic machining cycle for hand-operated ram type turret lathes. An entire line of hydraulic tracer units has been developed with various capacity ratings covering a complete line of turret and automatic lathes. Also being perfected is a tape-controlled unit for job-lot work on hand-operated turret lathes.

Machine Standardization Can Be Carried Too Far

—HOWARD N. MAYNARD

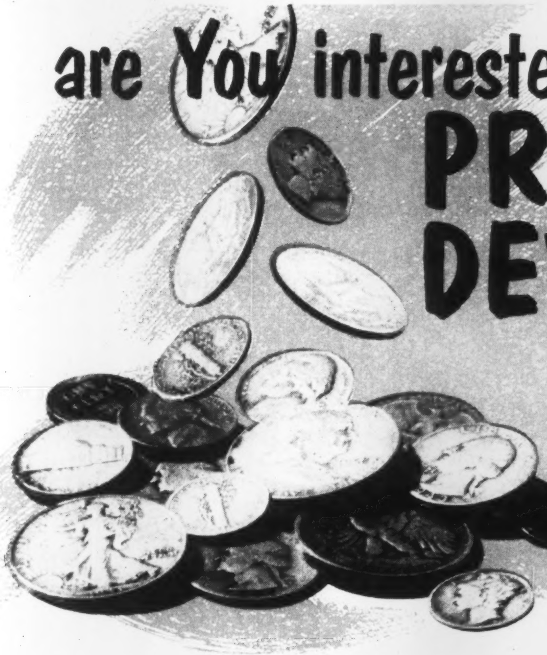
The demand for flexibility and ease of retooling transfer-type machine tools continues to be an urgent one. The use of standard machining units helps to solve the flexibility problem. But the extent to which standard unit concepts are applied should be watched. If standardization is carried too far, production and cost advantages are wiped out.

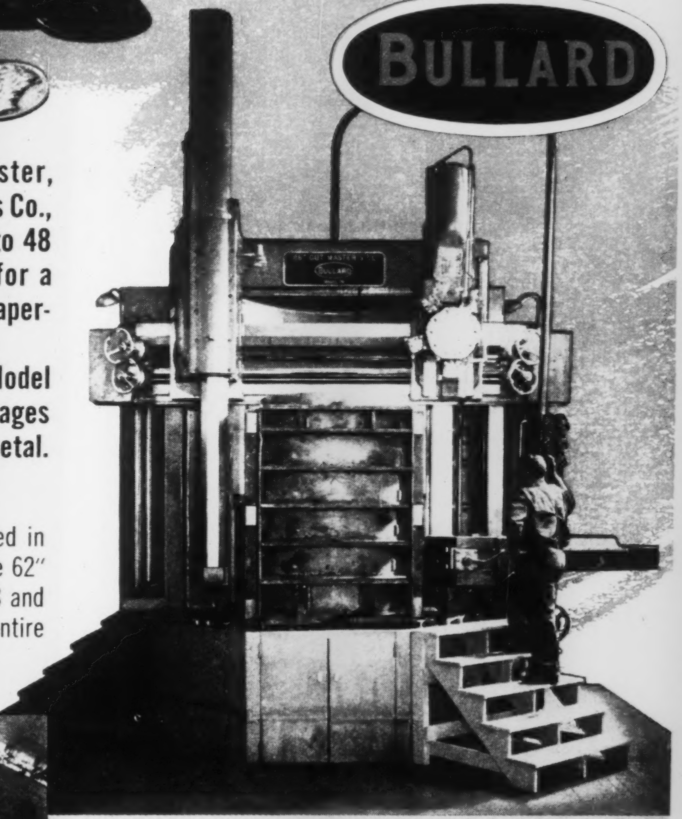
More simplified, low-cost methods for troubleshooting complicated electrical control panels will be developed to meet industry's increasing

are You interested in

PROFIT DEVELOPMENT

through reduced machining time *and Lower Costs . . .*

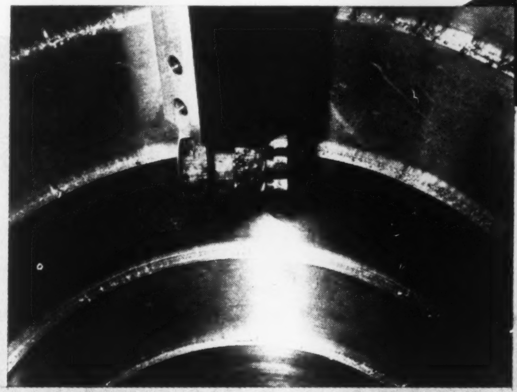




The new 66″ Bullard Cut Master, Model 75 purchased by E.D. Jones & Sons Co., Pittsfield, Mass., has reduced from 65 to 48 hours the machining time required for a 4,000 lb. stainless steel piece used in a paper-making machine.

The Bullard Cut Master V.T.L., Model 75 line offers many features and advantages to help you — cut costs when cutting metal.

The part, 68″ high, formerly had to be machined in three operations. Now, with an extension on the 62″ Ram, a table speed of 9.6 r.p.m., feed of .0208 and ⅛″ depth of cut, it is possible to machine the entire depth in one operation.



Close-up showing step boring and facing operation with 370 grade carboloy tool.

Complete details are available from your nearest Bullard Sales Office or Distributor or write

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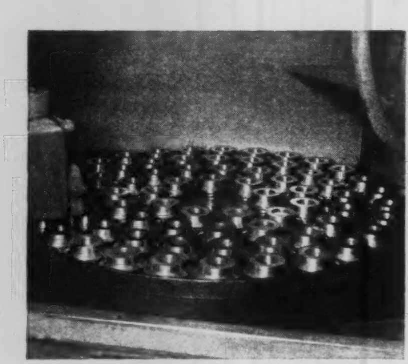
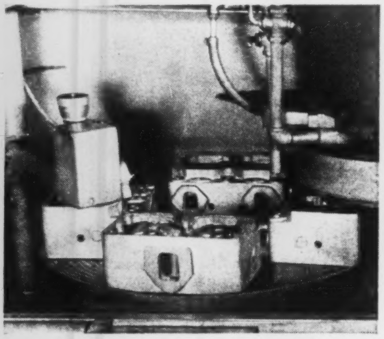
Whatever your grinding job may be...



200 adjusting screw washers are ground on one side in one hour. Stock removal .025″; limits ± .001″.

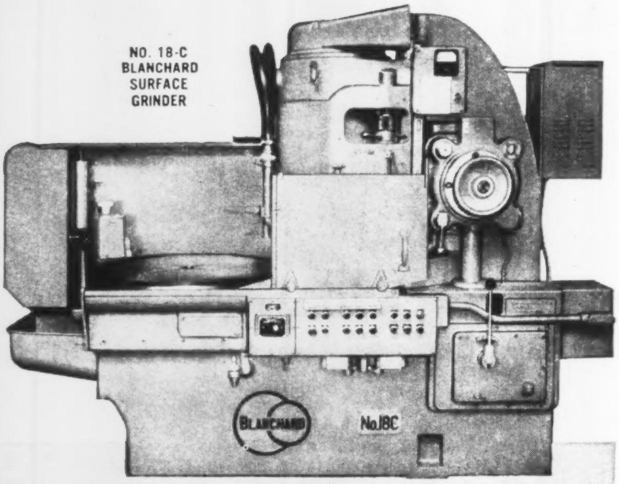


Tops of cylinder heads ground 21 per hour; stock removal 3/16″ to 1/4″. Bottoms 55 per hour; stock .012″; limits ± .001″.

56 cast iron plates are ground on one side in one hour. Stock removal .140″; limits .001″.

for best results...

The Blanchard No. 18-C Surface Grinder has the speed and precision that guarantees economical grinding on an endless variety of jobs. After the initial setup, the automatic cycle handles every operation from start to finish. The operator is freed to prepare the next load or to operate a second No. 18-C Grinder.



NO. 18-C
BLANCHARD
SURFACE
GRINDER

Put it on the Blanchard

The 18-C Automatic Cycle...

Moves chuck to grinding position and starts it rotating

Starts wheel rotation and coolant pump

Provides rapid wheel approach to work

Engages power down-feed at preset rate

Changes to fine feed just before finished size is reached

Stops feed when work is to size --"sparks" out. Raises wheelhead

Stops wheel, coolant pump, and chuck

Moves chuck to loading position – demagnetizes chuck

Can be changed quickly to manual operation

Automatically Controls Size!

Send today for your free copy of 18-C folder.

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RALPH G. LAGERFELDT
Executive Vice President, Colonial Broach & Machine Co., Detroit

H. G. BIXBY
President, Ex-Cello-O Corp., Detroit

MANUEL TURCHAN
Turchan Follower Machine Co., Dearborn, Mich.

C. J. MAHONEY
Industrial Engineer, North American Aviation Inc., Los Angeles

demands for less downtime on transfer lines.

Automation concepts, which can be considered to include the controls, handling, and gaging devices, will play a leading role in new, transfer-type, special machine developments.

Low-production plants can be expected to make wider use of semiautomated, special machine types, such as line-index, rotary-index, double-end, and trunnion-type machines.

Versatility of New Machines Is Termed a Must

—RALPH G. LAGERFELDT

The current emphasis on steel and high-strength alloys in the aircraft industry points up a production problem. It is complicated by the design changes of an industry in transition. In its machine tools, the industry needs high metal removal capacity and versatility. Tracer controlled machines are one answer. The "Erector set" models are also useful for similar applications using present equipment.

New broaching machines (electrically operated, gear driven types) supply the high speeds, long strokes, and high tonnages required by some operations. Also finding application acceptance are the recently introduced chain broaching machines. They permit the use of long strokes and continuous broaching at high speeds in highly compact machines. Inherently higher speeds are expected to hasten the broader use of carbide tools in broaching operations.

In machine design, much work continues to be done on rigidity, integrated fixtures, new controls, and trouble-free operation. More design effort is going into transfer machines. They are not intended solely for one-product automation but are flexible processing lines that will turn out different-size products in multiple operation, high speed production.

Points to Small Plants' Need For Improved Equipment

—H. G. BIXBY

Machine tool business is down, yet I believe that 1958 can be a good year.

We are applying electronic tracer controls to contouring operations; our automation machines are at work in many industries; and we are building tape controlled production machines.

Now we are going to have to sell the advances we have made. It will be necessary to go into plants and ferret out small orders. We will look for machines which are inefficient in the light of today's production equipment and replace them with units that increase production, lower costs, and insure profits.

We have sold the large manufacturing industries the machines they needed to bring their operations up to date and to meet competition. Perhaps we have neglected the smaller plants, but it is just as important for them to remain competitive.

Tracers Add Versatility To Machine Performance

—MANUEL TURCHAN

Shops seeking satellite and missile-work are finding that they must be equipped to do three-dimensional contour machining. The jobs involve intricate and precise machining such as internal and external contours, thin tapering walls, exact concentricity, and parallelism. Tolerances to within a few ten-thousandths make the use of repetitive, precision production equipment imperative.

One of the most important recent developments is being used to contour a wide variety of products—a magnetized tracer. It clings to and rolls around the template with uniform pressure and speed, covers 360-degree movement automatically, and eliminates variable speeds and pressures.

Another recent tracer development is a lathe attachment which permits a full, unrestricted swing for turning and boring. The control panel is simple. You can change from standard to tracing or thread-cutting operation with one lever control.

New Thermal-Cutting Method Shapes Tough Metals

—C. J. MAHONEY

Speeds of aircraft and missiles require high thermal resistant alloys in the control surfaces and fuselage structures. The skins of these structures require material preparation prior to machining or assembly.

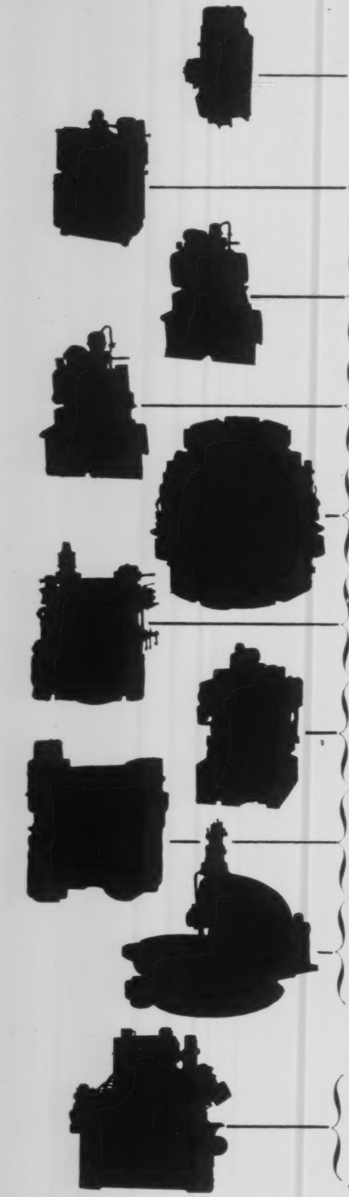
Shape cutting of stacked sheets and 0.250-in. plates of 17-7 PH, AM 350, and Inconel X have been successfully cut by a process using a gas shielded arc carried along a mild steel wire consumable electrode. The wire does not touch the material being cut and is burned off just beyond it. The arc blows the molten metal through the kerf. The gas mixture of oxygen and argon gases shields or stabilizes the arc.

Sixteen sheets of 0.032 in. 17-7 PH

(Please turn to Page 330)

FELLOWS GEAR CUTTING

GEAR SHAPERS



SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER	MAX. DIAMETRAL PITCH	MAX. FACE WIDTH	MAX. STROKES PER MIN.
3″ FINE-PITCH					
both	yes	3 inches ext. 2 inches int.	40 steel, 30 brass	3/4″	2000
No. 4GS					
both	yes	6 inches	5/7 spur, 6 hel.	2″	635
7-TYPE*					
both	yes	7″ spur, 6 1/2″ hel.	6 spur, 6/8 hel.	1 1/2″ ext., 1″ int.	450
7A-TYPE					
both	yes	7″ spur, 7″ hel.	5/7 spur, 6 hel.	2″ ext., 1½″ int.	450
No. 10 ROTARY					
both	yes	12 inches	3/4 spur, 5/7 hel.	3″ ext., 3″ int.	500
6A-TYPE					
both	yes	18 inches	3/4 spur, 5/7 hel.	5″ ext., 3″ int.	300
No. 12GS					
both	yes	12 inches	3/4 spur, 5/7 hel.	4″ ext., 4″ int.	550
36-TYPE					
both	yes	36 inches	3 spur, 4/5 hel.	6″ ext., 6″ int.	300
120-INCH					
both	yes	120 inches	2 spur, 4 hel.	8″ ext., 8″ int.	148

**Max. P.D. internal—5 1/2″*

GEAR HOBBER

NO. 12 GH2 HELIGUIDE

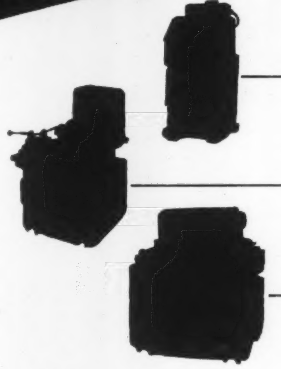
Spur and Helical, Max. O.D. 12″. Max. face width, spur, 6″; helical, depends on helix angle and diameter. Max. diametral pitch 4. Hob speeds 123 to 430 R.P.M.

Fellows also builds special-purpose machines for production of gears and other related items. Descriptive literature, technical data and price information is available on all types of equipment shown. Contact the nearest Fellows office.

THE
PRECISION
LINE
Fellows

PRODUCTION EQUIPMENT

FINISHING



SHAVING MACHINES

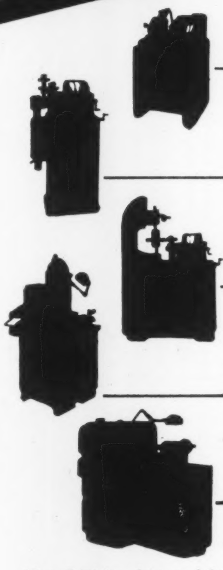
	SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER	MAX. DIAMETRAL PITCH	MAX. FACE WIDTH	MAX. SPREAD OF CENTERS
No. 4 FINE-PITCH	both	ext. only	4 inches	20	1 inch	12 inches
No. 8 "FULL-TOOL"	both	yes	8 inches	4	2 1/2 inches	**
No. 11 INTERNAL	both	int. only	***	6	1 1/2" up to 10P; 1", 12 to 16P	***

Also 12", 18" and 24" machines for externals only.

***Depends upon work-holding fixture*

****Depends upon design of gear*

INSPECTION



		SPUR AND HELICAL	EXTERNAL & INTERNAL	MAX. PITCH DIAMETER
FOR COMPOSITE CHECK	No. 4 FINE-PITCH RED LINER	both	yes	4 inches
	No. 8M RED LINER	both	yes	***
	No. 20M RED LINER	both	yes	18 inches
INVOLUTE PROFILE CHECK	No. 12M INVOLUTE MEASURING	both	yes	12 inches
CHECKING LEAD CROWN & TAPER	No. 12H LEAD MEASURING	both	yes	12 inches

Nos. 24M Involute and 24H Lead Measuring Instruments with capacity of 24 inches
****Depends upon design of gear*

Fellows Injection Molding Machines

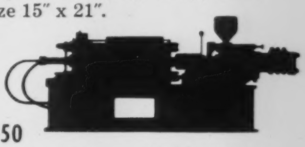
In each of three capacity ranges, Fellows plastic molding machines are your key to extra profit through high-speed, reject-free, fully automatic operation.

MODEL 3—125

3 oz. capacity, 45 pounds per hour, 600—840 cycles per hour (dry run), maximum mold size 12" x 17".

MODEL 6—200

6—9 oz. capacity, 75 pounds per hour, 490—650 cycles per hour (dry run), maximum mold size 15" x 21".



MODEL 12—350

12—20 oz. capacity, 150 pounds per hour, 700 cycles per hour (dry run), maximum mold size 20" x 31½".

Gear Production Equipment

THE FELLOWS GEAR SHAPER COMPANY,
78 River Street, Springfield, Vermont.
Branch Offices: 1048 No. Woodward Ave., Royal Oak, Mich.
150 West Pleasant Ave., Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Ave., Los Angeles 45

ALAN MATTISON
President, Mattison Machine Works,
Rockford, Ill.

J. P. CROSBY
Vice President-Sales, Lapointe
Machine Tool Co., Hudson, Mass.

CHESTER S. JOHNS
Sales Manager, Buhr Machine Tool Co.,
Ann Arbor, Mich.

WILLIAM W. GILBERT
Manager, Machining Development
Service, General Electric Co.,
Schenectady, N. Y.

were shape cut at 70 stack in. a minute. This rate of cutting is faster than comparable shape routing of stacks of aluminum sheets at 30 stack in. a minute. This cutting was accomplished more easily than comparable routing by using automatic tracing procedures.

Laboratory analysis of the cut edges of the stacked sheets showed such minute change of physical properties that material could be fusion buttwelded without removal of any material from the edges.

Grinders with More Power Remove Metal in Volume

—ALAN MATTISON

Outstanding results are being recorded on a broad range of jobs using grinders to remove metal in volume because more production men have learned how to use the process to greater advantage. For example, interrupted cuts that must be avoided when using other machining methods are an advantage in grinding because contact area is reduced between wheel and work, keeping the wheel open and free-cutting. Castings can be made lighter and designs modernized in other ways with the removal of this production barrier.

As more and more high-horsepower grinders become available, we find solutions for other manufacturing problems. Forgings and castings, covered with a tough outer scale, ordinarily take a heavy toll in cutting tools. High-powered grinders not only get under the scale to remove a sizable amount of stock in a single pass, but do it without damage to the wheels. The same machines are capable of precision jobs like finish grinding of flame-hardened machine ways, eliminating the need for costly and time-consuming hand scraping operations.

Dual-Use Broaching Units Of Improved Design Seen

—JOSEPH P. CROSBY

Broaching machines will have built-in automation, with two or more operations (such as drilling, counterboring, reaming) included.

Because broaching is one of the cheapest forms of metal removal, I believe the industry will emerge at the end of the year with advances in design and incorporation of automatic part and broach handling mechanisms never seen before.

The continuous, pull-down and pull-up machines are particularly adaptable to automation lines and self-loading mechanisms.

There will be further developments in the electromechanical drive, surface broaching machines using carbide broaches at higher speeds. This will result in further improvements by metallurgists in carbide.

Production Machine Standards Should Cut Retooling Costs

—CHESTER S. JOHNS

Good progress is being made in the building of high production machines with standardization of construction on an industry-wide basis. Although this development is in the somewhat preliminary stages, it is reasonable to assume that in the not too distant future, many aspects of high production equipment will have a standard form that can be followed by all machine tool builders.

It is hoped that with industry standardization of machine characteristics, excessive costs resulting from retooling requirements will be greatly reduced and delays in accomplishing changeover will be minimized.

Much can be done to apply high production technology in companies that manufacture many products in smaller quantities. Recent examples exist where variations to high production equipment design have resulted in one machine being capable of producing many parts of a similar product family. We feel that this trend will increase appreciably. We already know of specific instances where a machine tool that would normally be considered a high production piece of equipment is being applied to a jobbing-shop operation.

Oxides and Disposable Tools Boost Cutting Efficiencies

—W. W. GILBERT

Harder abrasion and heat resistant cutting tools, such as cemented oxides, will allow increased cutting speeds which require machine tools to operate at higher speeds. Since these tool materials are brittle, rigidity of the machine tool, the cutting tool, and the work must be improved. By taking advantage of these superior metal cutting properties, hardened materials may now be machined to finish size with an excellent surface finish.

Disposable tools will reduce tool change time and make it possible to

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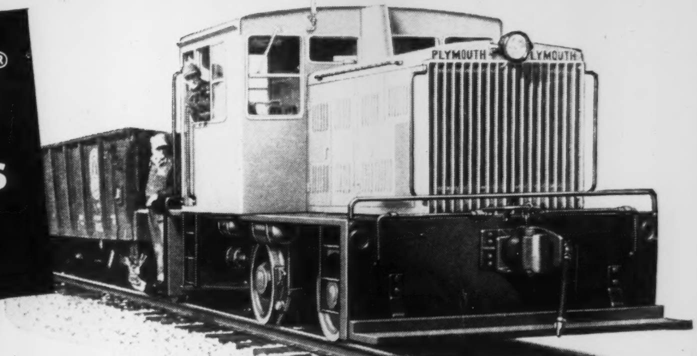
Power on the rails for *every* job!



Here's the lineup of well-known Plymouth power in models from 3 to 70 tons . . . narrow or standard gauge . . . Gasoline or Diesel . . . mechanical or Torqomotive Drive . . . Diesel-Electrics. Records of users show Plymouth's economy, efficiency, dependability. Find out how these profit characteristics can improve your operation and cut costs.

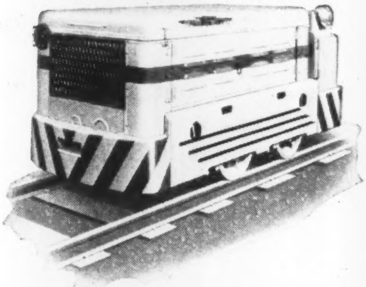
PLYMOUTH
LOCOMOTIVES

Send brief outline of your operating needs and problems for engineering analysis and new catalogs.

Plymouth Locomotive Works Division of
THE FATE-ROOT-HEATH COMPANY
Dept. A-1, Plymouth, Ohio

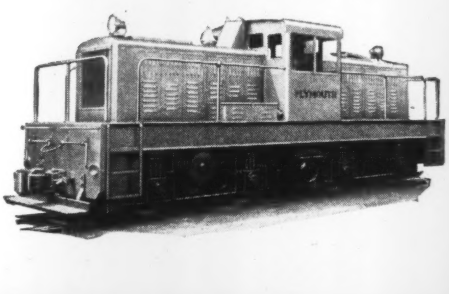
PLYMOUTH®
LOCOMOTIVES

WITH TORQOMOTIVE DRIVE

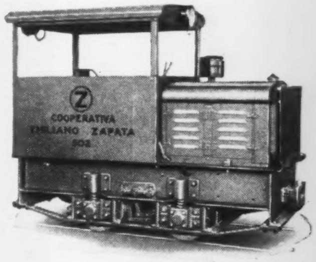


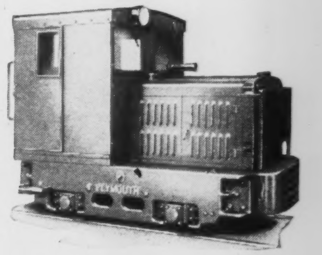
MINE-O-MOTIVE 5, 6, 7, 8, or 10 Tons Torqomotive* Drive. First Diesel-powered locomotive to operate in American coal mines, approved under Schedule #22, U.S. Bureau of Mines.

SERIES DE–25, 45, 50 Tons, Diesel-Electric Drive.

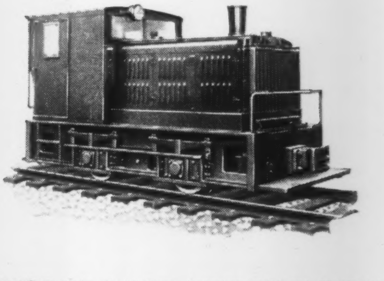


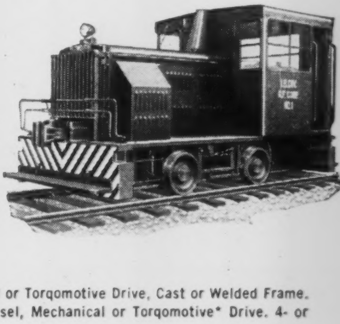
SINCE 1914 Plymouth Locomotives have been used for heavy hauling and switching jobs. They have proven themselves in year after year service with rock bottom economy, maximum availability, minimum down time. It takes a locomotive like Plymouth, ruggedly built, with plenty of power, and torqomotive control, to solve your switching and spotting problems efficiently, economically, and for many years to come.



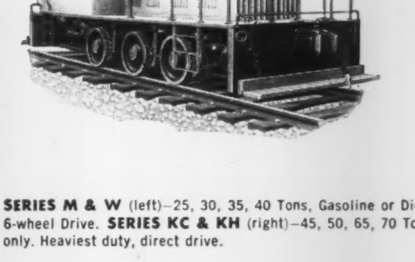


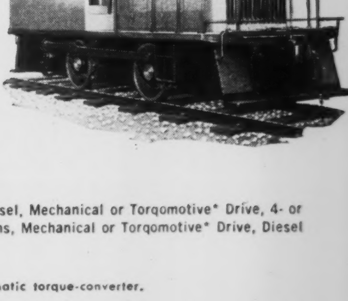
SERIES R&T (left)–3, 3½, 4 Tons, Gasoline or Diesel, Mechanical Drive, Compact for short turns, tight places. **SERIES F** (right)–5, 6 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive. Low center of gravity, short wheelbase.





SERIES D (left)–8, 10 Tons, Gasoline or Diesel, Mechanical or Torqomotive Drive, Cast or Welded Frame.
SERIES J (right)–12, 14, 16, 18, 20 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive. 4- or 6-wheel Drive.

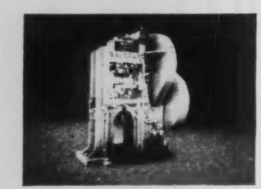




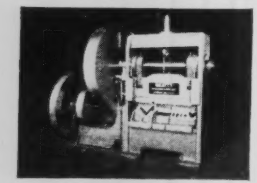
SERIES M & W (left)–25, 30, 35, 40 Tons, Gasoline or Diesel, Mechanical or Torqomotive* Drive, 4- or 6-wheel Drive. **SERIES KC & KH** (right)–45, 50, 65, 70 Tons, Mechanical or Torqomotive* Drive, Diesel only. Heaviest duty, direct drive.

****Torqomotive Drive:*** Plymouth transmission coupled to automatic torque-converter.

IN THE BEATTY FAMILY OF FINE METAL-WORKING EQUIPMENT YOU'LL FIND MACHINES FOR BENDING STRAIGHTENING — SHEARING FLANGING V-BENDING PRESSING AND NOTCHING



BEATTY No. 7 Detail Flange Punch speeds single hole flange punching; eliminates end-for-end turning of beams. 100-ton cap.

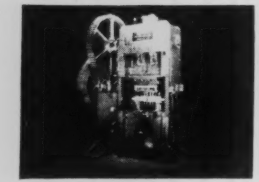


BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.

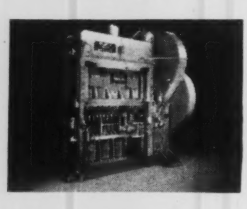
Got a metal-working problem? Chances are, from the Beatty family of metal-working equipment you will find the *right* machine for the job. Right in cost . . . right in production speed . . . right in engineering concept.

Beatty machines have an enviable reputation for accurate, dependable, day-in-day-out operation. They're built rugged and rigid to keep downtime at a minimum — boost production. Don't let obsolete equipment rob *you* of production and profits. Get all the information on a Beatty installation to fit your needs . . . talk it over with a Beatty engineer.

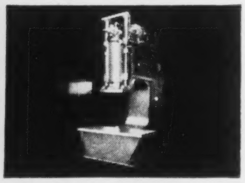
BEATTY MACHINE & MFG. CO.
966 150th St. Hammond, Indiana



BEATTY Guillotine Beam Flange Punch for flange punching of beams. Built-in adjustable tools save set-up time. 200 ton cap.



BEATTY Guillotine Beam Punch punches webs and flanges in I-beams from 6 to 30 inches.



BEATTY Gap Type Press for forming, bending, flanging, pressing. 250 ton cap.

operate at higher economic machining rates. These higher machining rates are obtained by balancing the cost of replacing a cutting tool with the cost of operating the machine tool, giving tool lives as low as 4 minutes to obtain the minimum cost per part.

Harder, difficult-to-machine materials are used in high temperature applications, such as jet engines, making electrical methods of machining more popular. Electrospark cutting, using ultrahigh frequencies, will be used for producing precision finishes on intricate shaped parts. Electrolytic grinding is also used for producing stress-free surfaces on hardened or thin parts. The methods give engineers new design possibilities.

KIRKE W. CONNOR
Chairman, Micromatic Hone Corp., Detroit

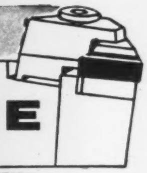
Use of Honing Will Gain, Boost Stock Removal Rate

—KIRKE W. CONNOR

Many new designs and techniques which will improve quality and production, and reduce processing costs, will be forthcoming in the honing process. Automatic equipment will be tailored in standard units to fit the needs of each user. Controls will be simplified and made more compact.

Processing will be simplified by reducing the number of operations performed on a surface and by the use of honing, not only to generate functional accuracy, but also to remove increasing amounts of stock. The principles of efficient, low-velocity abrading will be applied to a greater variety of shapes, materials, and surface conditions.

YOU GET MORE "CUTABILITY"



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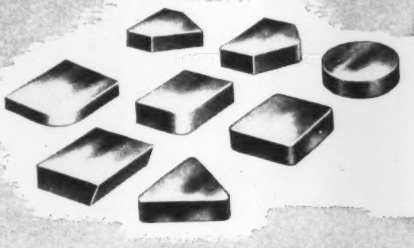
NEWCOMER

Controlled Quality

CARBIDES



You can always rely on NEWCOMER performance . . .

FOR CUTTING STEEL

Grade	Description	RECOMMENDED		
		Cut Depth	Feed	Speed (SFPM)
NS-15	Precision Finishing	.004" to .060"	.004" to .024"	250 to 850
NS-2	General Purpose	1/64" to 1/2"	.005" to .040"	150 to 525
NS-3 NS-4	Milling and Roughing	1/8" to 1"	.010" to .090"	100 to 500
NS-65	Heavy Roughing	1/16" to 1 1/2"	.020" to .125"	75 to 200

FOR CUTTING OTHER MATERIALS

Grade	Description	RECOMMENDED		
		Cut Depth	Feed	Speed (SFPM)
NC-2	Precision Finishing	1/64" to 1/4"	.005" to .020"	200 to 1000
NC-3	General Purpose and Milling	1/16" to 3/4"	.010" to .040"	200 to 1000
NC-4	Roughing	1/8" to 1"	.020" to .093"	Moderate 80 to 1000
NC-5	Extra Heavy Roughing	1/8" to 1 1/4"	.040" to .125"	Slow 20 to 150

FOR HIGH VELOCITY MACHINING

Grade	Description	RECOMMENDED		
		Cut Depth	Feed	Speed (SFPM)
NewMet NM-95	Not a ceramic nor a tungsten carbide, but an all new METALLIC CUTTING MATERIAL for cutting steel and other materials	.001" to 1/4"	.001" to .015"	to 1500

In today's production picture, profitable metal removal calls for tooling efficiency that pares machining costs "to the bone." Made with a consistent, reliable, high hardness-toughness ratio from lot to lot, Newcomer Controlled Quality Carbides are designed to take their place in your production picture and give you more "CUTABILITY."

With Newcomer Carbides, "CUTABILITY" means faster speeds and feeds . . . heavier cuts . . . exceptional resistance to interrupted cut impacts . . . and a wear resistance that gives you "extra mileage" on every production run.

For reliable and consistent metal cutting . . . specify NEWCOMER *Controlled Quality* CARBIDES!

For high velocity machining . . . it's NewMet by NEWCOMER

NP CONTROLLED QUALITY CARBIDE

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STRIPPIT *tooling versatility*

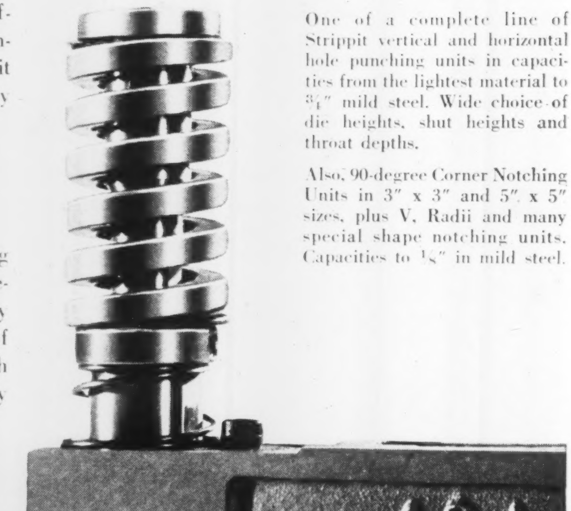
keeps presses working, not waiting!

Nothing to mount on the ram, nothing to align or adjust — just place your Strippit setup in the press and start the run.

That's how Strippit versatility pays off. Any good bench man can mount these independent self-contained punching and notching units in any template pattern within press capacity. New Strippit setups can be kept ready for the press, virtually eliminating down-time.

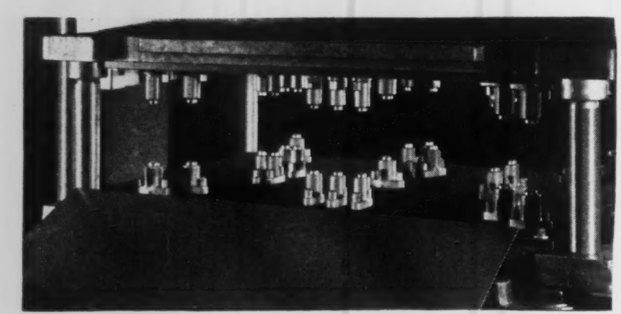
For flatwork, extrusions, structurals from the smallest gauge to 3/4" mild steel, Strippit gives you these extra advantages:

• The effect of quick-change dies without die-making or die-spotting • Speed over drilling — plus no deburring • Units re-usable over and over • Readily removable punches and dies • Ease, accuracy of template mounting — pilot pin centered on punch • Each unit complete — permanently aligned, fully guided, self-stripping.



One of a complete line of Strippit vertical and horizontal hole punching units in capacities from the lightest material to ¾" mild steel. Wide choice of die heights, shut heights and throat depths.

Also, 90-degree Corner Notching Units in 3" x 3" and 5" x 5" sizes, plus V, Radii and many special shape notching units. Capacities to ⅛" in mild steel.



For unlimited feeding of work, Strippit Type CD and JD (heavy-duty) Punch and Die Assemblies are readily template-mounted to press ram and bed in any desired pattern.

Write today for all details and a demonstration by a Strippit mobile unit at your plant.

Special tools made up to your specifications.
Warehouse facilities in Chicago and Los Angeles.

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WALES STRIPPIT COMPANY
210 Buell Road, Akron, New York

Manufactured in Canada by Strippit Tool & Machine Limited, Brampton, Ont.

EDWARD KIBBITT
Manager, Stupalox Dept., Stupakoff Div., Carborundum Co., Latrobe, Pa.

STEWART G. FLETCHER
Vice President-Metallurgy, Latrobe Steel Co., Latrobe, Pa.

D. S. HERR
Manager, Sales Development Dept., Shell Chemical Corp., New York

W. J. KALLIO
Chief Product Engineer, Chicago Latrobe, Chicago

FORUM ON TECHNICAL PROGRESS

Tooling and Gaging

Oxide Tips Can Be Cemented To Shanks of Tools

—EDWARD KIBBITT

Since oxide tool material does not readily lend itself to conventional brazing, most of the work has been done with mechanically held insert tools. This has, of course, been a serious handicap in production. We have made available a line of cemented tools. The tip is pocketed and cemented to the shank, using an epoxy resin cement. Testing has shown that the bond is more than adequate, and we are now able to use oxides on many applications which require a brazed or cemented tool.

Tool Steels Have New Role As Structural Materials

—STEWART G. FLETCHER

An important trend in tool steels is their emergence as highly useful engineering materials in special applications. The good high temperature hardness of high speed steels will undoubtedly further their use in bearings and hydraulic pumps which must operate at elevated temperatures. The high strength and reasonably good ductility of the medium carbon, 5 per cent chromium, hot work die steels are rapidly projecting them into structural applications in supersonic aircraft. We anticipate considerable growth in these and similar applications in the next few years.

Emphasis on improved machining properties of high speed steels, air hardening die steels, and hot work die steels is continuing. Use of these free-machining materials is growing steadily.

Plastic Dies Use Fibers To Gain Heat Conductivity

—D. S. HERR

In the past year, one of the most potentially useful developments in plastic tooling stems from the use of fibrous metal fillers. Dies fabricated from a mixture of Epon 828 and steel or aluminum wool show a much higher thermal conductivity than is achieved from a similar system employing steel or aluminum powder as a filler. The fibrous nature of the filler also makes a marked improvement in the tensile strength. A drawback to the use of metal fibers arises from the need for pressure during fabrication to obtain sufficient filler loading.

A second development this year has been in epoxy molding powders. It has made possible the molding of tubes and parts with greater strength, providing characteristics not available in conventional molding materials.

Cutting Fluid Pressures Rise In Deep Hole Drilling

—W. J. KALLIO

Today's trends in deep hole drilling are toward greater utilization of cutting fluids under high pressures for the rapid ejection of metal cuttings. Fluid pressures as high as 150 psi were previously used in oilhole gun drilling. Improvements in hydraulic pumps and coolant supply systems make it possible to obtain constant working pressures as high as 800 psi. In some cases, coolant pressures exceeding 1000 psi are being used successfully. An increased flow of cut-

A. B. ALBRECHT
Metallurgical Engineer, Monarch Machine Tool Co., Sidney, Ohio

HARRY E. CONRAD
Executive Secretary, American Society of Tool Engineers, Detroit

E. J. KRABACHER
Senior Research Supervisor, Cincinnati Milling Machine Co., Cincinnati

G. C. TAAFFE
President, Cincinnati Lathe & Tool Co., Cincinnati

ting fluid with these higher pressures permits a more efficient use of the cutting tool at speeds never before practical.

Higher speeds and forced evacuation of chips provide an impetus to new design developments in drills and reamers. They also necessitate further improvements in machine tool design and greater use of high speed precision spindles and cutting fluid filters. They also demand new coolants that will not only act as cooling agents but also provide adequate lubrication without overheating under pressure.

New Tool Materials Influence Machine Design

—A. B. ALBRECHT

We can be certain that more use will be made of indexing tool blocks, constant surface speed control, automatic cycles, and precision contouring equipment. They will be necessary to utilize properly the capabilities of harder carbide and oxide tool materials. Conversely, machines of greater accuracy, with higher spindle speeds, are being designed which certainly will require cutting tools having a high degree of edge-wear resistance.

More accurate data are needed regarding the correct tool grade for machining a given alloy. It is basically a problem of developing a more complete understanding of the mechanism of tool wear. Present applications of oxide tooling for finish turning have developed interest in the elimination of grinding on finishing operations. Future possibilities with the harder grade tool materials look promising, especially when new machine tools having the necessary speed range and power become available.

One thing is certain. Increased interest in the oxide and harder carbide tool materials will force many metalworking plants to review their present equipment. Experience indicates the need for machine tools having extreme accuracy, high spindle speeds, and improved rigidity for efficient use of these new tools.

Tooling Industry To Spend More For Research

—HARRY E. CONRAD

The tooling industry recognizes the vital need for developing as many new means as possible to increase productivity to its highest possible level. Research is being done in virtually every area of industry, and new information is being made available to anybody who wants it.

If production volume should drop off somewhat, as many people expect it will, the employment of new methods and processes will become all the more imperative to offset increased manufacturing costs. It should result in a greater use of automatic tooling, increasing the production of numerically controlled and other cost-reducing equipment.

Hot Machining May Be Answer To Tough Machining Problems

—E. J. KRABACHER

High strength, high temperature resistant metals have created a metalworking problem of significant proportions. It's most urgent in the aircraft industry. An extremely high rate of tool wear and drastically curtailed production rates go with the machining of these materials. Intensive research in machining technology is needed.

Our approach to the problem is both basic and applied, employing all the physical sciences and engineering. One principal means of attack is in the area of "hot machining."

Ceramic tools continue to attract widespread interest and increasing use. Considerably improved materials were made available in 1957. The new materials are less subject to brittle fracture, allowing broader applications. Ceramic materials have been applied to high speed milling of steels of low to medium shear strength under laboratory conditions. The breakthrough is significant because of the general inability of ceramics to withstand impact. It greatly broadens the potential of these materials.

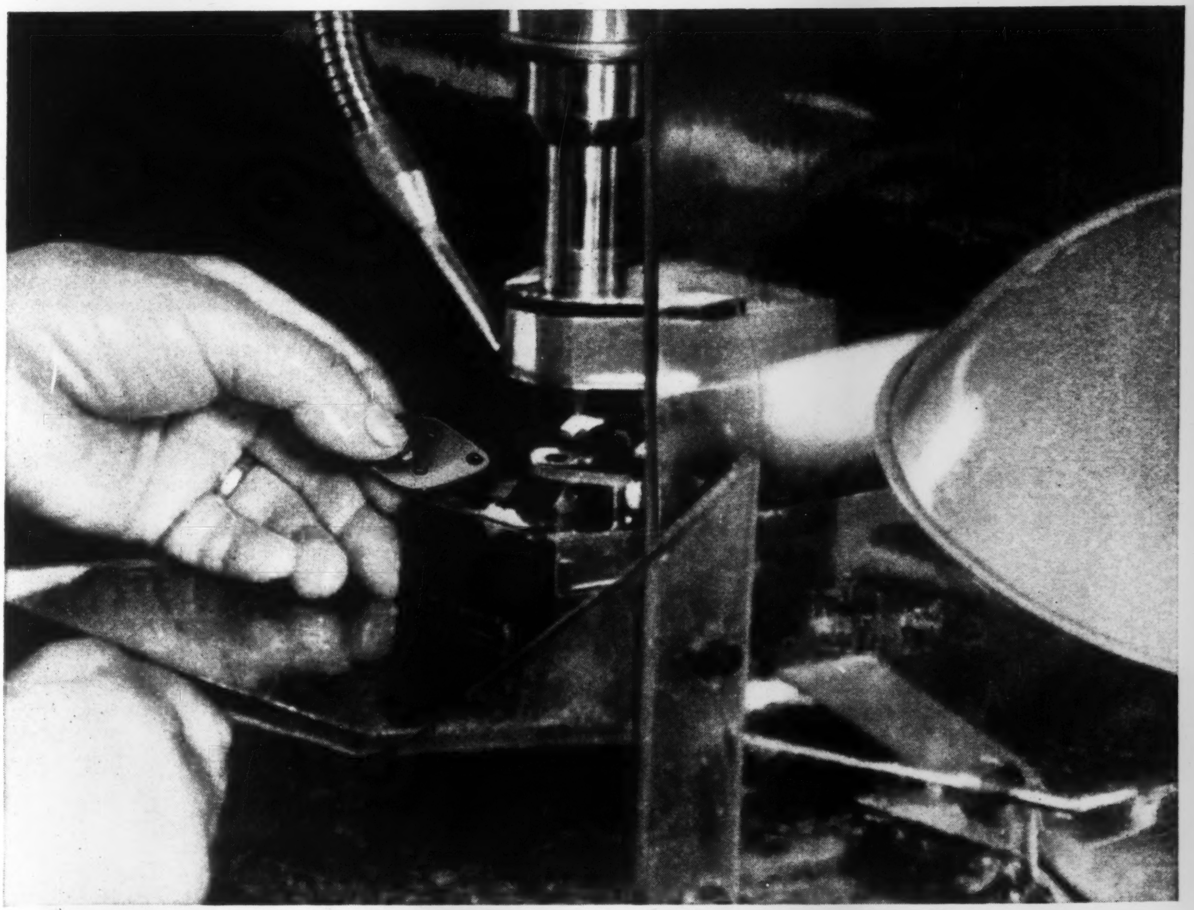
Spiral Point Upgrades Drill To a Precision Tool

—G. C. TAAFFE

We believe the conventional twist drill is on the threshold of being transformed from a roughing to a precision cutting tool. It will be a significant contribution to all segments of industry in which drilling is done.

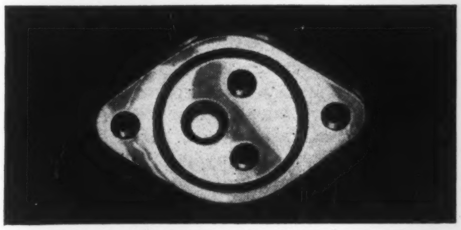
In co-operation with the research department of the Cincinnati Milling Machine Co., we have developed a new concept in drill point geometry termed the "spiral point." It has many advantages over the standard conventionally ground chisel point drill:

1. It produces a rounder, straighter hole which is truer to size. 2. It increases drill life. 3. It eliminates center punching. 4. It reduces drill



MACHINING HIGH-PRECISION GROOVE in power transistor bases was easier and faster when Truelove & Maclean, Inc., switched to Anaconda Leaded Copper-126 in strip form.

High machinability plus high electrical conductivity with Anaconda Leaded Copper—now in strip form, too!



TRUELOVE & MACLEAN, INC., Waterbury, Conn., started making bases for power transistors used in Motorola car radios from nonleaded copper. Bases are first stamped then have grooves machined. Specifications are strict; tolerances are close—±.002" on diameter of groove and ±.003" on most other dimensions. Tool cost was high—production slow. They were faced with the necessity of buying additional equipment to meet daily production schedules. An American Brass representative studied the problem, suggested Anaconda Leaded Copper Strip. The results: tool life increased 10 times; production was speeded 25%; over-all costs went down 25%—plus greater accuracy.

When you have to do complicated or precision machining on parts requiring high electrical properties, Anaconda Leaded Copper-126—now available in strip form—can save a lot of trouble and expense.

High machinability. Anaconda Leaded Copper Strip machines almost as readily as Free Cutting Brass. It has a machinability rating of 80%, compared with 20% for nonleaded copper. This means faster production and longer tool life—greater latitude in design.

High conductivity. Anaconda Leaded Copper Strip has an approximate electrical conductivity rating of 99% IACS.

Get in touch with your American Brass Company representative for details of widths and thicknesses available. Or write: The American Brass Company, Waterbury 20, Conn.

5775

ANACONDA®

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Mfg. Research & Development,
Martin Co., Baltimore

W. B. DUNCAN
Chairman of the Board, Wesson Co.,
Ferndale, Mich.

thrust force as much as 34 per cent. 5. It produces less workpiece distortion because of cooler cutting and reduced thrust force. 6. It maintains accuracy of hole positioning. 7. It reduces the need for secondary operation, such as reaming in many instances. 8. When applied to sheet metal it produces a rounder, practically burr-free hole.

The spiral point terminates at its center in a sharp point. It automatically centers itself on the axis of the drill when first engaging the workpiece and remains in that location. There is no tendency to walk as in the case of the chisel point. In addition, the large negative rake angle found at the chisel point is greatly reduced, which improves the cutting efficiency of the point.

Machining Costs Can Be Cut By 10 to 50 Per Cent

—HARRY CONN

In the near future, shorter tool life and higher feeds and speeds, combined with quick-change tools, will put us well on the road to significant reductions in over-all machining costs. First, industry in general must learn the difference between "good tool life" and "economic tool life" to obtain the greatest return on the machine tool investment instead of being concerned with the cost of the drill, tool bit, reamer, or whatever cutting tool is used.

Early in 1957 this statement was made: "With the now known scientific knowledge in the field of metal cutting, it is possible to reduce machining costs from 10 to 50 per cent in almost all plants." It has been proved and the systematic approach to reduced machining costs through better utilization of machines and tools is known as "optimation."

The basic concept is a simple one —drastically reduced costs result from running machines at optimum speeds and feeds, using quick-change toolholders and presetting tools before they are inserted into the machines. It's a logical extension of this trend that in the next step we will progress to automatic tool change.

New Approaches Needed For Future Production

—A. L. WINKLER

Rapid development of supersonic planes and ultrasonic missiles presents an ever increasing demand on the metalworking industry to fabricate materials of greater strength and hardness.

Only five years ago, materials of 180,000 psi were giving the industry headaches. Today, it is not uncommon to find materials of 220,000 psi being worked in production shops, and this is only the beginning. Current thinking is in terms of materials of 300,000 psi with even higher values in the near future.

It seems that up to 260,000 psi the tools and methods we are using could, with further development, prove adequate. But as we exceed these values we also exceed the ability of these tools and methods to do the job.

Obviously, we are going to have to change our methods if we are to go on to higher values. For instance, in the laboratory we can drill material of 280,000 psi on a limited basis; we also know that with even greater limitations we can drill material as high as Rockwell C-68—and that is just about as hard as any steel alloy we have today.

But drilling under laboratory conditions is a far cry from production work. If fabricating these new high strength materials is to be economically feasible, we are going to have to devise new methods of machining.

The electrical discharge method appears to hold the most promise, but even this needs further refinement before it can meet the demands of economical production. The developments are probably going to be all-encompassing, covering new types of coolants, new tools and new machines. But the biggest change is going to take place in our thinking. It is going to have to be imaginative, bold, and efficient. We cannot afford to overlook a single opportunity. No matter how fantastic a new idea may seem, no matter how foreign it may be to the way we have been used to doing the job, we must examine it with an open and imaginative mind.

Throwaway Cutter Trend Is Toward Complex Tools

—W. B. DUNCAN

Although the primary feature of throwaway tooling is the economy realized by eliminating grinding, the same feature is providing sound basis for other major advantages not immediately apparent.

Definite design rules for conventional round tools, such as boring, reaming, and milling cutters, do not apply to the throwaways because of the no-grind feature. A three-bladed boring cutter is considered poor design from a maintenance standpoint. In throwaways, however, such considerations just do not apply; they do not make any difference.

This explains why the throwaway trend is to more and more complex tooling and represents a renewed practical effort to combine separate operations (and tooling) into a single multiple-insert tool design.

A positive illustration of this is the comparison between a large automotive brakedrum manufacturer's tooling in 1958 with his 1957 setup. The boring, chamfering, and grooving operations that were being done separately on '57 brakedrums have now been combined into a single complex tool. This design—from every

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Rodman Laboratory, Watertown Arsenal, Watertown, Mass.

LOUIS POLK
President, Shefield Corp., Dayton, Ohio

JOHN DELMONTE
President, Furane Plastics Inc., Los Angeles

standpoint—would have been highly impractical, if not impossible, with conventional tooling requiring regrinding.

Electronic, Air Gages Tops On Measuring Device Lists

—F. S. BLACKALL

For ultrahigh speed gaging, as well as working with high magnifications, electronic and pneumatic gaging are becoming the preferred means of measurement. Modern electronic circuits contain long-lived components and operate independently of line voltage fluctuations. A large range of special auxiliary computing and control devices is readily adapted to such equipment.

Rapid advancement in pneumatic gaging techniques has paralleled these developments. Pneumatic and electronic or electric gaging, used in combination, are increasingly providing the key to successful automatic production processes. Such systems with high speed, feedback features are available in package forms for accurate automatic machine control and automatic inspection systems.

Electronic amplifier circuits and transducer pickup units have been developed especially for high accuracies, faster responses, and wider flexibility. The new units also offer more reliable and efficient service for inspection, ranging from single bench type comparators to extensive multipurpose gaging systems.

Another refinement in modern gaging systems is the addition of memory devices, which permit the machines to continue in operation so long as a predetermined number of out-of-tolerance parts is not produced consecutively. This allows for periodic errors in machining or gaging which may be caused by chips, or dirt, or occasional variations in material.

Ceramic Tool Brittleness Is Research Target

—W. B. KENNEDY

Probably the most important work on ceramic tools at present is directed toward improving ceramic material quality through better material processing. The objective is to develop less brittle ceramic grades which will take abuse. Experimental work on milling is promising. It demonstrates the improvement in material quality which has developed the last two years.

Most ceramics are produced by cold pressing, followed by sintering, but hot pressing during sintering seems to offer some advantage in the final over-all quality of the tool material.

The tool engineer may look forward to the employment of ceramics in the machining of: 1. New materials that are tough, have high strength, and are temperature resistant. 2. The more conventional and ultra-high strength steels.

Developments in Gaging Tied To High-Speed Automation

—LOUIS POLK

A method of pulsing x-rays instead of using continuous radiation, has been developed to pinpoint thickness measurements of films and foils moving at speeds up to 6000 ft per minute. The new pulsed x-ray gage offers significant advantages in higher speed of response, as well as in economic operation, ease of installation, and excellent safety features.

Technical developments in the use of automatic equipment for straightening, assembly, and weighing have come fast. Multifeedback systems to control high-speed production are also gaining ground at an accelerated pace. New multifeedback units that combine measurement and memory have been designed to control as many as 20 machines or more simultaneously. Loop feedback controls are employed to stop or correct any one of the machines as soon as it begins to approach tolerance limits.

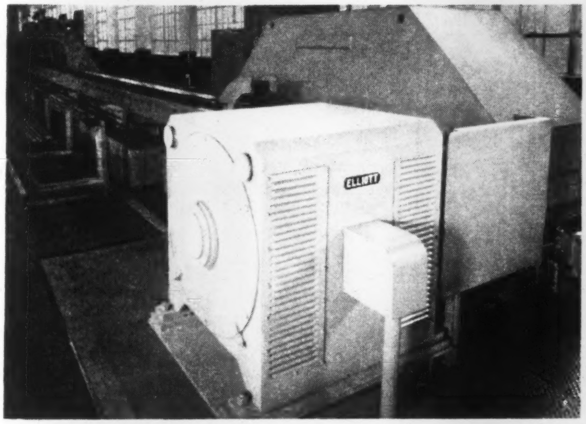
The dream of errorless manufacturing moved one step closer to reality. Research and development have produced complete systems of instruments, controls, and machines to regulate quality through all stages of production, inspection, assembly, and packaging.

Plastic Tools Woo More Jobs In Small Metalworking Plants

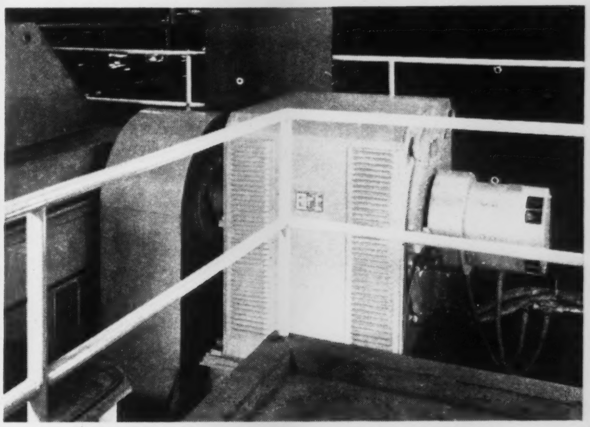
—JOHN DELMONTE

A concerted effort toward introducing plastic tools to smaller machine shops, foundries, and metalworking establishments has taken place in recent months.

Fortunately, this trend is coupled with new improvements in epoxy tooling material which will aid in their acceptance. Safety hardeners, for example, have reduced the probability of dermatitis when handling the epoxy laminating and casting resins. Also available are newer epoxy casting resins which are nearly foolproof—ideal for inexperienced personnel of smaller plants. Such items as plastic lathe jaws, holding fixtures, assembly jigs and hydropress forming tools, have become standard equipment in the machine shop.



This Elliott 400-hp, 900-rpm, dripproof, squirrel-cage induction motor drives a triple-die drawbench at the Torrington Division of The American Brass Company.



At the Reading Tube Corporation, this Elliott 500-hp, 900-rpm, dripproof, synchronous motor, with direct-connected exciter, drives a drawbench.

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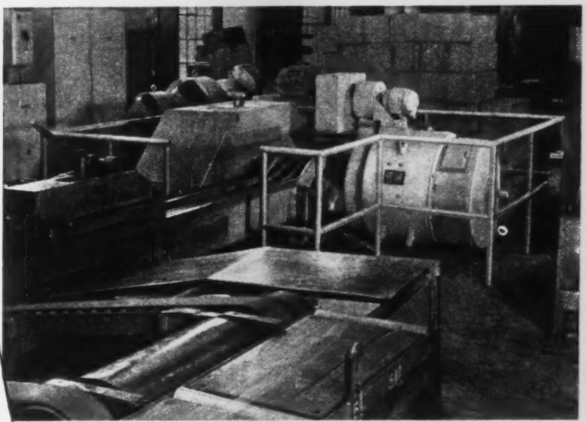

Here an Elliott d-c motor, 100-hp, 400/1200-rpm, force-ventilated with top-mounted blower and filter, serves the Revere Copper and Brass, Inc.

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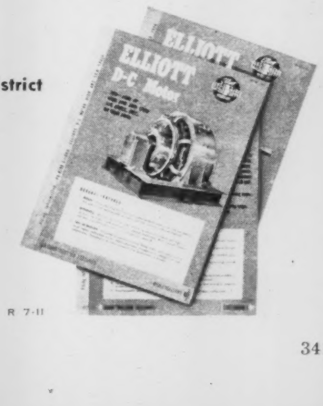
assure **TOP PERFORMANCE**...permit **EASY MAINTENANCE**

The illustrations above show three types of Elliott motors—squirrel cage, synchronous, and direct current—employed for drawbench drives. Extensive experience permits Elliott engineers to recommend and successfully apply the type of motor best suited for each individual drive. The rugged construction of Elliott motors insures dependable operation, even in the most difficult operating conditions.

All Elliott motors have the sturdy frames needed *for enduring strength and rigidity* . . . the well-insulated and securely-braced coils required *for long life* . . . and offer a variety of styles of well-designed bearings *to meet individual operating conditions.* Advanced designs incorporate the latest engineering and structural developments, and provide easy accessibility for routine inspection and maintenance.

Elliott engineers will gladly give you the benefit of their wide experience, whether your requirements may be for a complete new system layout, or a modernized existing installation.

Call your nearest Elliott district office *today*, or write for descriptive literature.



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Automatic Control Engineering,
Federal Products Corp.,
Providence, R. I.

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Plastic tools, capable of operating at high temperatures, are also creating considerable interest among compression and injection molders of plastics as well as fabricators of special metal parts (magnesium and titanium) requiring high temperature forming. Improved high temperature formulations offering substantial strength in the 300 to 400° F range are now available from epoxy and polyester plastics.

Speed, Precision, Ease Are Gage Development Aims

—R. ALLEN SOULER

Acceptance of standardized gaging components for machine control and automatic inspection has become apparent recently and will continue. They represent readily available building block items for user-design gages and are quickly replaceable to provide substantial savings in downtime.

Also gaining widespread acceptance are gages which incorporate one air-electric module for each dimension gage. If the part is acceptable, indication is made by a large green light. If not, a light on one or more of the modular units indicates the out-of-tolerance dimension and whether the condition makes the piece salvageable or scrap. Operator doesn't have to scan multiple columns or dials, and is not required to make borderline decisions.

The compact, transistorized electronic gage is now a reality; powered by a 300-hour battery it provides high magnification, extreme sensitivity, and complete portability.

Coming up: High speed air gaging systems which have capabilities of up to 40,000 pieces per hour.

Also on the way: A trend away from automatic final inspection. Preference will be for gages located on or immediately after the producing machine to control size by sensing trends and making correction before tolerance limits are exceeded.

New Ceramics Show Gains In Machining Ability

—W. M. WHEILDON

This past year has seen considerable effort placed on the improvement of alumina ceramic tool composition. Continued research and development have achieved a new composition with much more wear resistance and durable characteristics.

One new composition has shown over 1000 per cent improvement in performance over our previous marketed tool. It has been released this fall for controlled field testing to verify machinability test results.

More than 100 combinations and variations have been studied with respect to microstructure and physical properties. They have been subjected to machinability tests.

Tool geometry for testwork has involved the use of a 45 degree negative land 0.005 in. wide on all cutting edges and has been found to materially increase tool life and the quality of surface finish produced. The limited information received from our field evaluation program already indicates unusual cutting performance on steels up to 52 Rockwell C.

Gun Drilling Advances; It's Now a Standard

—FREDERICK S. BLOCH

The use of the precision drill, particularly where the tool revolves rather than the work, is rapidly becoming a standard method of machining. We expect it to hit its full stride in the next few years.

The near future will see a sharper division between toolroom, short-run machines, against high production equipment with self-loading and ejecting features and self-indexing units. Most machine builders have machines beyond the design stage or in building at present. This means redesign of assemblies with troublesome holes is advisable to take advantage of the methods that drill an accurate hole in a single operation.

Directional and dimensional accuracy in holemaking has brought the use of the gun drill and the related gun-bore tools into prominence.

Carbides Take Over On Structural Jobs

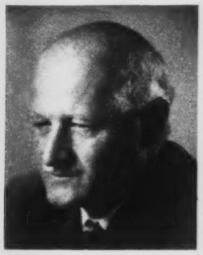
—PHILIP M. McKENNA

Boring bars of tungsten carbide have improved tool performance by greatly reducing the vibration at the point of the tool. Cost of machining in slender bores has often been reduced to a fifth of what it had been when steel bars were used.

Gun drills have been provided with tungsten carbide shanks to which the harder wear resisting steel-cutting grades are attached. The vibration at the point of the cutting tool is a third as great as steel shanks; the edge lasts a great deal longer—sometimes, ten times as many pieces are drilled between regrinds.

Hexagonal platelets of tungsten carbide alloy have been put on the market in convenient form for silver soldering to such things as ways of machines and crusher jaws.

FREDERICK S. BLOCH
President, Eldorado Tool & Mfg. Corp., Milford, Conn.



PHILIP M. McKENNA
President, Kennametal Inc., Latrobe, Pa.

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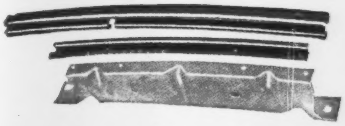

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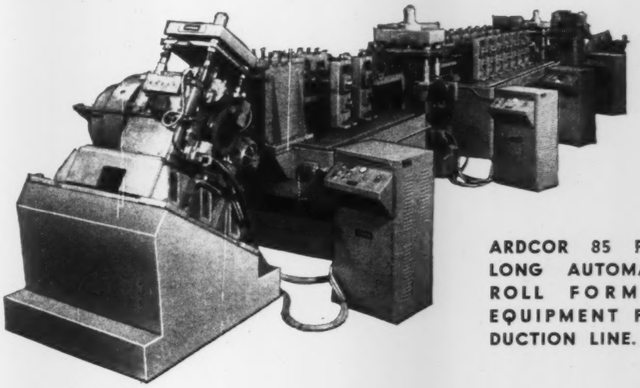

ARDCOR 85 FOOT LONG AUTOMATED ROLL FORMING EQUIPMENT PRODUCTION LINE.

ARDCOR Roll Forming Equipment, now used by one of America's leading Automotive Manufacturers, for roll forming Upper and Lower Seat Tracks for 1958 model cars.

Starting from the coil box (in the background of the photo above), the stock travels at high speed through a succession of operations including Leveller, First Pre-Notcher, Forming Mill Passes, Second Pre-Notcher, Two-Drive Coiling Fixture, to the Cutoff Press shown in the foreground. Four Pulpit Control Stands are located at the two Pre-Notching Stations, Forming Mill, and Cutoff Press, giving the operators completely automated or emergency control at every station.

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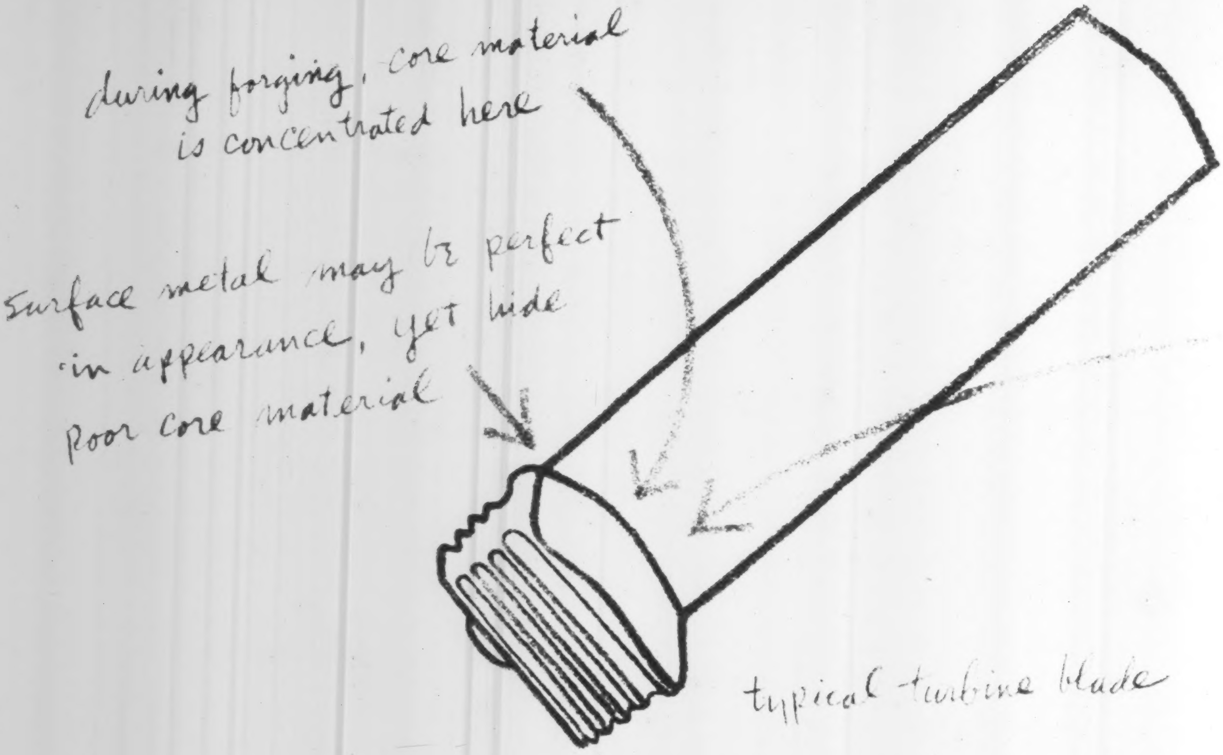
during forging, core material is concentrated here
surface metal may be perfect in appearance, yet hide poor core material
typical turbine blade

Tough, modern applications are making uniformity of metals more important than ever before. In the turbine blade sketched here, for instance, porosity or segregation just can't be tolerated, because it may cause a rejected part or a weak one.

Mel-Trol is Carpenter's answer to industry's challenge for better, more uniform alloys. Now, for the first time, you can be sure you're getting alloys that are as strong and tough at the core of the bar as just under the surface . . . uniform throughout and uniform lot after lot. You can make more good parts, fewer rejects. You can know in advance the kind of results you can expect when you work these alloys, and when parts go into service.

Mel-Trol is a careful system of highly developed quality control procedures. It uses patented Carpenter techniques along with the most modern equipment available to the steel industry. Every control is used to its fullest capability—its greatest accuracy. The result is the most completely refined

strength critical here, because stress concentrates here.
Any centerline weakness may cause cracks in forging
or eventual failure in service. Mel-Trol alloys
are uniformly strong and free from segregation,
ideal for applications like this because metal at
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. . . there's uniform freedom from centerline weakness, porosity and segregation in alloys made by this exclusive *Carpenter* process

and perfected steelmaking process used in any known steel mill today. It eliminates the problems of centerline weakness, segregation and other internal defects by eliminating their causes.

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Col., USAF, Wright Field, Dayton, Ohio

F. LYIJYNEN
Stamping Div., Chrysler Corp., Detroit

WILLIAM DOLLE
President, Lodge & Shipley Co., Cincinnati

FORUM ON TECHNICAL PROGRESS

Forming

Vacuum Degassing Paramount For Prime Quality Forgings

—A. O. SCHAEFER

How should steel for open die forgings be melted? Is the usefulness of the acid open hearth nearing its end? Will the electric furnace replace all open hearths? Are we to look beyond the electric arc furnace toward consumable electrode melting for the metal of the future? These are some of the important questions facing metalmen in 1958.

Not all these problems will be settled finally. It does appear that the trend toward electric furnace metal will gain momentum.

Vacuum degassing of metals is of paramount importance to the forging manufacturer. Flakes must not appear in his product. Complete vacuum melting for making forging ingots seems impractical yet. Stream degassing will continue to spread in forging, particularly if data appear to support the predictions made for it.

As appreciation for the need grows, look for forging specifications emphasizing transition temperatures (as indicated by notched impact specimens). It means lower austenitizing temperatures, better control, and increased use of liquid quenching. The prejudice against such requirements in large sections will diminish.

It is too much to hope that we will arrive at recognized standards for ultrasonic examination of forgings. There will be many such proposals. Many are working toward that end.

Explosives Promise New Era Of Cheaper, Better Forming

—JOHN N. DICK

Forming or shaping titanium and stainless with explosives or cartridge-actuated tools eliminates the need for heavy equipment, hard dies, and elevated temperatures. The increased usage of such high strength materials makes necessary the development of radically new methods.

With the explosive method, metals so tough they can't be handled any other way can be formed with little or no springback.

The Air Materiel Command's Manufacturing Methods Branch is developing explosive forming techniques for aircraft parts. We plan to try explosives for extruding, forging, punching, flaring, swaging, and upsetting. Some of the expected benefits: Reduction in capital equipment costs and forming presses; longer lasting, cheaper tools; increased production; and lower production costs.

Standards for Plastic Tools Will Aid Industry Acceptance

—F. LYIJYNEN

Plastic tooling has become an established resource, used and accepted by many manufacturers. It has great value in fabricating checking, drilling, and routing fixtures; spotting racks; die model duplications; hammer forms; and draw dies.

The biggest need in plastic tooling is testing standards. They would help eliminate false claims.

The American Society of Tool Engineers, in co-operation with the Society of the Plastics Industry (SPI), is working on standard test methods. They have initiated a research program at Purdue University. The first phase, covering test methods for

WALDEMAR NAUJOKS
Manager of Engineering, Kropp Forge Co., Chicago

C. C. CADITZ
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ARTHUR J. STOCK
Research & Development Mgr., Acheson Colloids Co., a division of Acheson Industries Inc., Port Huron, Mich.

J. K. WINGARD
Manager of Engineering, E. W. Bliss Co., Canton, Ohio

volumetric and linear shrinkage has been completed. Next on the program are a standard impact test (neither the Izod nor the Charpy tests has proved satisfactory), and abrasion tests. The SPI has also set up a tooling division for plastics which is seeking to standardize plastic tooling construction.

Cold Forms Large Cylinders For Missile, Rocket Bodies

—WILLIAM DOLLE

Significant progress was made in cold flowing metal during 1957. The trend is expected to grow.

A new Floturn machine with a vertical spindle can produce 60 in., thin wall cylinders up to 30 ft long without welding. Called the vertical multi-roller, radial Floturn, the machine has many possibilities for research, development, and testing of rocket and missile bodies. Tooling and production costs are less than those for conventional methods.

Floturn machines are also used to make high quality kitchen wares, utensils for dairy, restaurant, and food packing industries.

Short Run Forgings Practical With Insert Impressions

—WALDEMAR NAUJOKS

There is an increasing use of closed die forgings (drop forgings) for small volume requirements—particularly in the small and medium sizes.

The idea that expensive die equipment is necessary for all drop forgings has been changed. Many shapes can be produced by insert impressions which reduce the cost of preparation charges and make small volume requirements (50 to 500 pieces) economically feasible.

New techniques using the flat die hammer, the Reduceroll, or the forging press, eliminate some preparatory steps in the production of medium and large forgings. In some cases, only a finishing die is necessary when quantities are small.

Stampers Use More Precoat Materials in Lubrication

—C. C. CADITZ

Heavy emphasis on cost and inflexibility in stamping operations will force many companies to buy rather than make their stamping requirements in 1958. It is doubly important to firms whose space and investment capital are tight.

The coming year will probably see greater use of precoated materials in stamping.

Special Lubricants Needed To Form New Superalloys

—ARTHUR J. STOCK

With the increasing need for high temperature metals and superalloys, the problem of lubrication during forming has become critical. Higher preheat temperatures (sometimes within 50° F of the melting point) and new lubricants are helping to provide the answers.

Notable among the heat resistant lubricants is colloidal graphite—an old performer on a new assignment. Applied as a dispersion in water, it is finding wide industrial acceptance because of excellent properties which extend die life. It also eliminates smoke and fire hazards, contributes to improved working conditions and labor relations.

Metalworking can look forward to the continued development of hot forming lubricants. Various lubricating pigments now under test include molydenum disulfide, graphite, and ceramic materials. They will be designed to establish a low-friction film between the workpiece and die cavity and to act as surface sealants to protect sensitive alloys from reaction with the atmosphere.

Wire forming is expected to assume more importance, especially with metals like titanium. Usage of resin bonded lubricants containing molybdenum disulfide may be extended. It is possible that certain metals will be drawn, forged, or extruded only in conjunction with specific tailor-made lubricants.

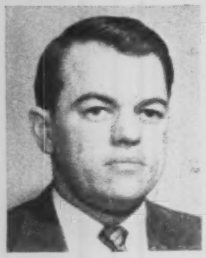
Emphasis Put on Transfer Feed And Electronic Press Drives

—J. K. WINGARD

Technical development and application improvement in the forming and press design field have proceeded rapidly in the last year and will continue.

Accent will still be on automated units and larger components made on transfer feed presses. The trend will lead to larger presses and to synchronized separate presses in a single production line.

Dual-sliding bolsters with auto-



R. B. STRIBLEY
Manager, Phosphate Coating Div., Detrex Chemical Industries Inc., Detroit

CARTER C. HIGGINS
President & General Manager, Worcester Pressed Steel Co., Worcester, Mass.

MELVIN D. VERSON
Vice President-Administration, Verson Allsteel Press Co., Chicago

BYRON B. BELDEN
Application Engineer, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio

EUGENE C. CLARKE JR.
Chambersburg Engineering Co., Chambersburg, Pa.

matic die clamping, slide positioning, and automatic counterbalance adjustment will be featured to a greater degree.

Electronic controls are getting more play. Improved electronic press drives will soon permit adjustable slowdown, instant reversal, and jogging in forward and reverse directions. Look for greater use of direct current, variable voltage equipment.

Cold forming and extrusion will continue to progress. Powdered metal parts will be more widely used.

Die, Press, Coating Changes Made To Improve Finishes

—R. B. STRIBLEY

Cold extrusion of mild steel has reached a point where manufacturers no longer are satisfied with just being able to do the job.

Lubricant and phosphate coating suppliers, as well as steel die and press manufacturers, are being asked for better finishes, greater speed and greater reductions. Those demands are being met by outstanding advances in die and press design and new lubricants and phosphate coatings. The new Extrudite process of phosphate coating and lubricating has shown the results they ask for.

Cold extrusion work with stainless steels (mainly drawing) has made tremendous progress. Processing procedure for stainless steel is steadily becoming a science. Cold extrusion of stainless steels will shortly be as easily accomplished as it is in carbon steels.

Some Stampers Add Assembly, Heat Treating to Operations

—CARTER C. HIGGINS

Along with more precision, stamping users will be asking for more complete services, including such operations as assembly, finishing, and heat treating. Some stampers are responding by adding the operations. Others are pushing proprietary products.

There is interest in coining bosses and grooves in stampings. Such operations are economical, compared to machining.

Many stampers are turning to steel rule dies for their larger blanks.

Another trend is toward increasing the technical knowledge of the sales force to help solve customers' problems.

There are reports of stamping users dropping plans for captive plant expansion because of tight money. The cause: Incomplete understanding of auxiliary equipment needs.

Cold Extrusion Being Extended To High Carbon, Alloy Steels

—MELVIN D. VERSON

Cold extrusion is in its infancy. Its biggest advantage is in material savings. For example, internal and external contours can be extruded accurately enough to require only a finish grinding.

Current techniques are concerned with low carbon steels. Continuing experimentation is leading to successful production in higher carbon and alloy steels. We expect that this year, 1959, and 1960 will bring substantial production increases and cost savings.

Some parts can be cold extruded at rates up to 50 pieces per minute.

New Compacting Press Designs Feature Flexibility, Versatility

—BYRON B. BELDEN

Makers of presses for compacting metal powders are continuing to improve their products. Several press companies have introduced new designs.

The emphasis has been on flexibility, versatility, and ease of tool setup.

The press manufacturers' interest in improved press design is opening up new possibilities to fabricators of metal powder parts.

Baldwin-Lima-Hamilton is building an automatic 1000-ton compacting press. It will be the largest of its type ever to be built for compacting metal powders.

Impact Forging Advances As Tests Reveal Potential

—EUGENE C. CLARKE JR.

Impact forging and forming of metals is gaining new significance. The almost instantaneous application of force is one of the most efficient ways to deform metals. Accelerated blows of a hammer or an Impacter does forging with a minimum of die contact. In some instances, it's the only way that some of the tougher alloys can be forged satisfactorily to precise shapes.

The potential of impact forging is being explored with each new application of the shockless Impacter. The closed die forging process and

. . . somewhere
this forging die
is making history!

Both halves of the die were Eloxed in only 50 hours.

Elox equipment used to create the impression costs less than half of conventional tooling equipment.

After washout, Elox equipment will have it back in service in seven hours.

In our Pre-purchase Evaluation division we will demonstrate how Elox can machine the cavities in your closed impression dies at 75% of your present cost. Write or phone today.

10″ Connecting Rod Forging
Max. depth impression: 5/8″
Min. depth impression: 1/16″
Tolerances: + or − .003″

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ELOX keeps you ahead of competition • All forms of Die Making • Form Grinding and Tool Sharpening

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For details on how EDM machining of cavity type dies can prove profitable for you, write for Bulletin P7-1257 all the EXTRAS are standard with

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Member of the National Fluid Power Association

- **NEW** *exclusive* ingenious cushion designs... Super Cushion Flexible Seals for Air... New Self-Aligning Master Cushion for Oil.
- **STRONGER** than outmoded tie rod design, proven through actual tests. No tie rods to stretch.
- **SOLID STEEL HEADS** throughout the full line.
- **COMPACT DESIGN** eliminates tie rods, increasing the strength and reducing mounting space required, providing extra room for adjacent equipment.
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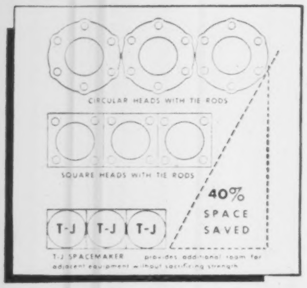
CIRCULAR HEADS WITH TIE RODS
SQUARE HEADS WITH TIE RODS
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40% SPACE SAVED
T-J SPACEMAKER provides additional room for adjacent equipment without sacrificing strength

You *save 40% space* when you switch from outmoded tie rod cylinders to the T-J Spacemaker! It's stronger, too! Fits right into automation programs in countless plants. Delivers top performance and dependability with a big *plus* in advanced features. Wide range of styles, capacities . . . reduces man-hours and costs in all kinds of push-pull-lift jobs. Off-shelf delivery in 64,000 combinations!

NEW LITERATURE—Send today for new Catalog SM56 with complete engineering details on Spacemaker line. Write The Tomkins-Johnson Co., Jackson, Mich.

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RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

JOHN M. DAVIDSON
Sales Manager, Pennsalt Chemicals Corp., Philadelphia

CARL J. PFEIFER
Sales Manager, National Cored Forgings Div., Bridgeport Brass Co., South Norwalk, Conn.

mechanical stock handling is expected to bring about important changes in closed die forging.

Cites Need for Integration In Stamping, Forming

—JOHN M. DAVIDSON

Improving the press alone is not enough to keep pace with rapid advances in metal forming. The entire process, from the receiving dock to the end product must be integrated. The two most promising solutions are, cold forming and dry soap lubricants.

Extrusion and cold heading can be geared into almost any time cycle. With the new automatic spray and dry soap films, less demanding draws can be fed to a press in rapid sequence.

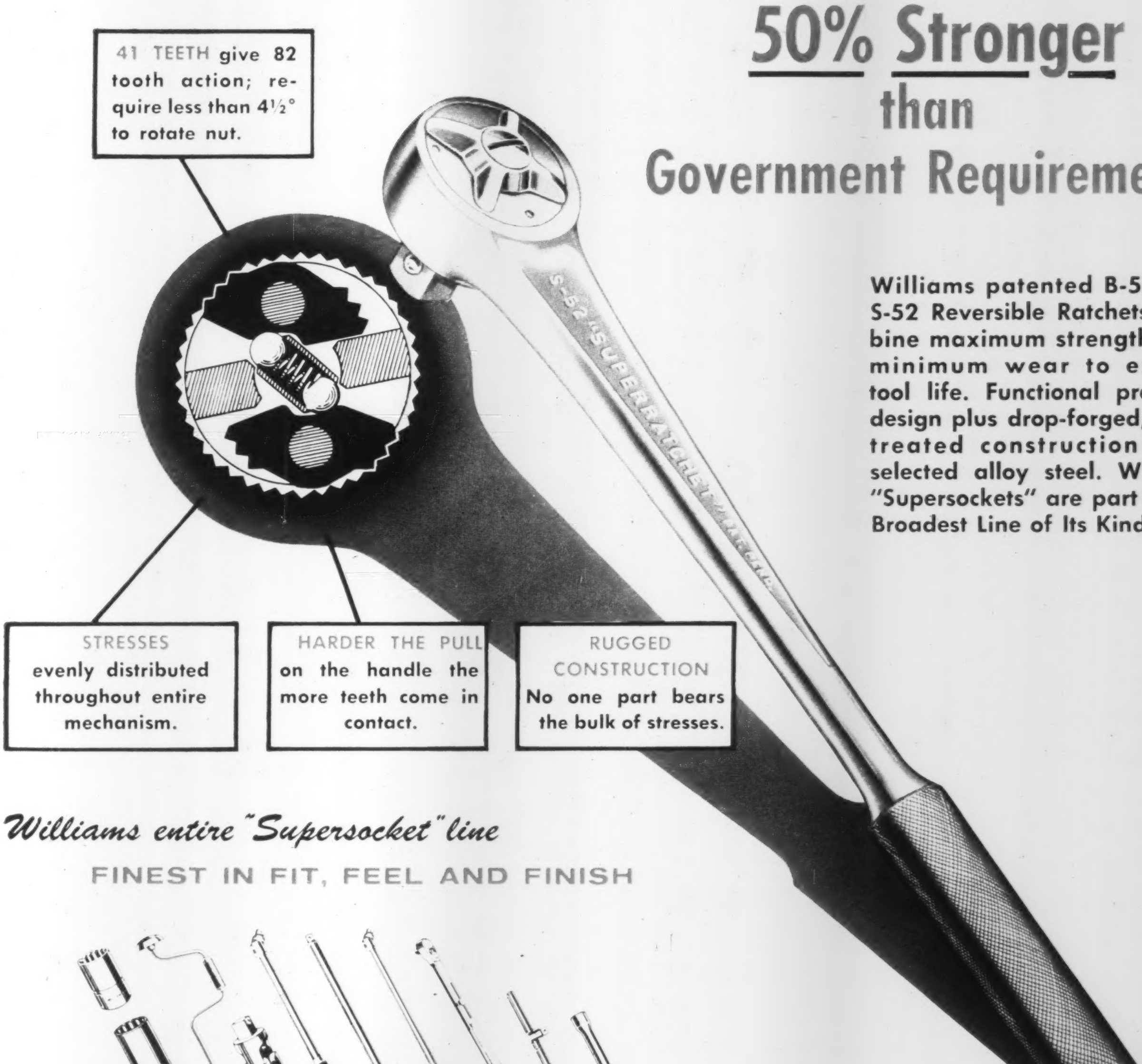
Increasing Use of Forgings Due to Closer Tolerances

—CARL J. PFEIFER

Our job is to keep closer and more uniform tolerances and to eliminate one or more extra machining operations. The trend toward forgings is becoming more evident since the cost

Williams Superratchets®

50% Stronger
than
Government Requirements



41 TEETH give 82 tooth action; require less than 4½° to rotate nut.

STRESSES evenly distributed throughout entire mechanism.

HARDER THE PULL on the handle the more teeth come in contact.

RUGGED CONSTRUCTION No one part bears the bulk of stresses.

Williams patented B-52 and S-52 Reversible Ratchets combine maximum strength with minimum wear to extend tool life. Functional precision design plus drop-forged, heat-treated construction from selected alloy steel. Williams "Supersockets" are part of the Broadest Line of Its Kind.

Williams entire "Supersocket" line

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¼, ⅜, ½, ¾ and 1" Square Drive Sizes. Openings from 3/16" to 3⅛".

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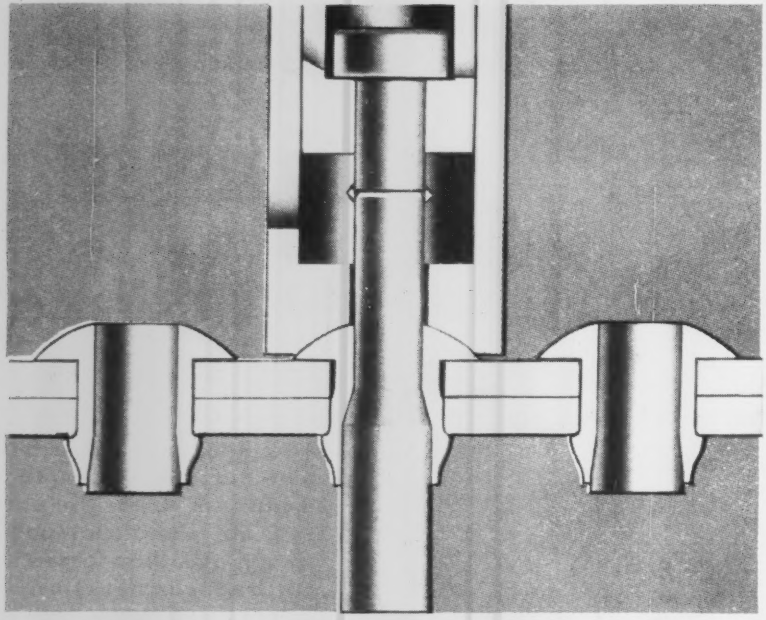

More than a Fastener . . .
A FASTENING SYSTEM
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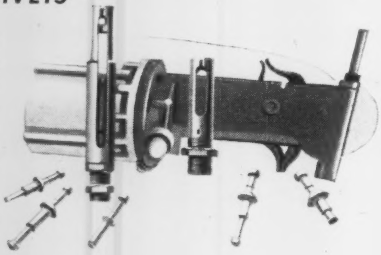


Townsend has engineered blind rivets and setting tools to create a simple, and therefore, economical fastening system. The patented knob stem of the rivet engages a pulling head in the gun which sets the rivet. This head has only two parts, and the rivet is set with a single squeeze of the gun trigger. Engagement of the knob stem is positive and quick even for operators without any special skills.

Pulling heads are extremely durable. The fit between draw-bolt and sleeve is comparatively free, so that wear is slight and tools can be used in the presence of dirt and grit with little danger of clogging. Uninterrupted production, long wear, and negligible maintenance are assured by this simple, sturdy design; and initial tooling costs are low.

Townsend knob stem blind rivets are available in a wide range of sizes and materials in both self-plugging and pull-thru types. Hand, air and electric powered tools can be supplied to meet any production conditions. For full details on the economical Townsend blind rivet system, ask for a demonstration or for Bulletin TL124. Townsend Company, P. O. Box 237-C, New Brighton, Pennsylvania.

The Fastening Authority
Townsend
COMPANY • ESTABLISHED 1816
NEW BRIGHTON, PENNSYLVANIA
Sales Offices in Principal Cities
Cherry Rivet Division • Santa Ana, California
In Canada: Parmenter & Bulloch Manufacturing Company, Limited, Gananoque, Ontario

JAMES F. LELAND
Assistant Sales Manager, Parker Rust Proof Co., Detroit

of machining is now a major item.

We expect increasing conversions to forgings this year.

Phosphate Coat Ups Die Life For Cold Heading, Deep Draws

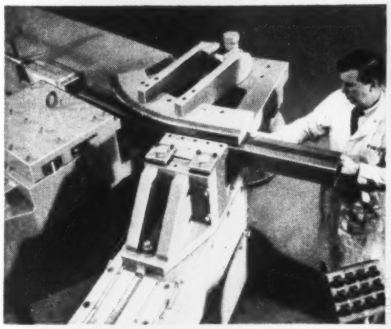
—JAMES F. LELAND

A phosphate coating process is showing cold heading manufacturers the way to greater savings, improved die life, and a more uniform product. Manufacturers can purchase hot-rolled rods, remove the scale, and lubricate for cold heading or drawing without pickling.

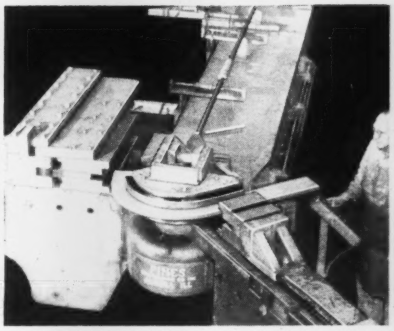
Some producers of cold heading rods are furnishing a Bonderite coated product in place of the conventional baked lime coatings. Without phosphate coatings, many parts were impractical to make on a production basis.

Cold extrusion has gained impetus. Companies with such facilities are greatly in demand. The zinc phosphate coating is an important factor in the lubrication of cold extrusions. Many parts formerly made by machining are regularly cold extruded.

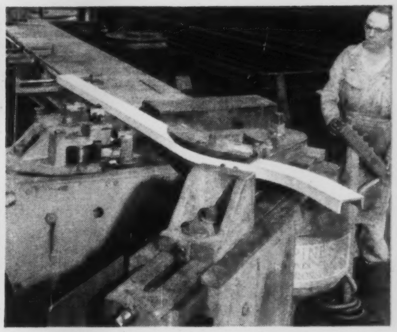
Hot and cold rolled strip with a phosphate coating is finding its way into a number of deep-draw press shops. Coatings are applied continuously followed by a rolled-on soap film. Records show a substantial reduction in part breakage when lower quality drawing steels are used. Other benefits: Cleaner press operation and remarkable decreases in press downtime due to freedom from galling. The method shows up best on difficult forming operations. The application is similar to that used in the manufacture of bumpers.



HEAVY RECTANGULAR TUBES—accurately formed on Pines Model 4 on a 24" inside radius for air cushion assembly on heavy duty truck chassis. Material is 4" x 5½" x .200" wall.



SOLID STEEL BEAMS—cold edge bending of 5½" x 1¼" steel bars on Pines Model 4 replaces hot bending on dozer, produces more accurate parts at lower cost for road machinery manufacturer.

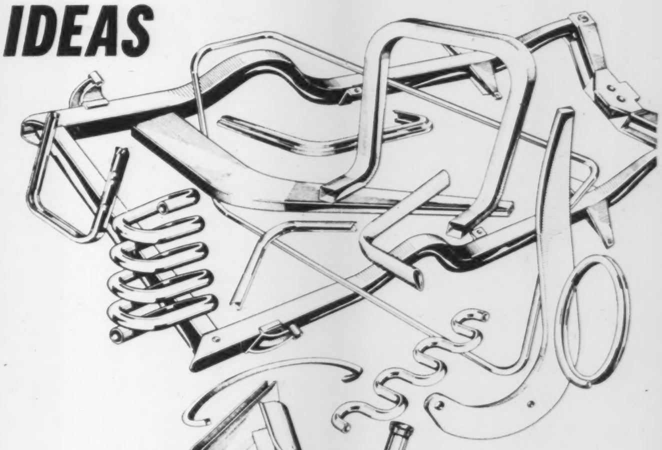


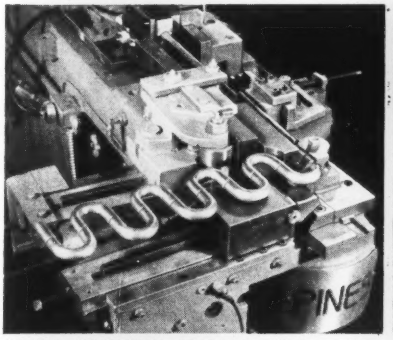
ALUMINUM CHANNELS—rugged machine construction and tooling on Pines Model 3 Machine cold forms 4" x 1¾" x .320" aluminum channel without wrinkling or distorting. Spring-back is controlled by simple machine settings.

FOR COST CUTTING IDEAS

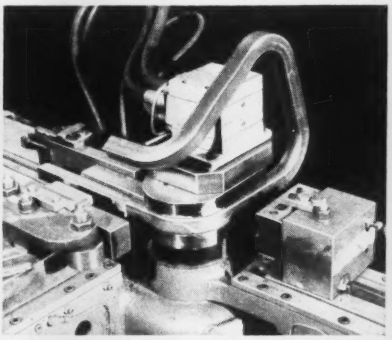
INVESTIGATE PRODUCTION BENDING THE "PINES-WAY"

When you have a production job requiring the cold forming of parts from round, square, rectangular, extruded, or hollow stock to an even radius, or to different angles, we suggest you investigate the cost cutting advantages of production bending the Pines-way. The examples shown here illustrate a few of the many different and varied applications which are today profitably produced on Pines machines. Cold bending is a fast, accurate, easy to control metal forming process that is today more profitably applied in the production of an ever increasing variety of products. Call on Pines engineers for assistance without obligation on any specific job.

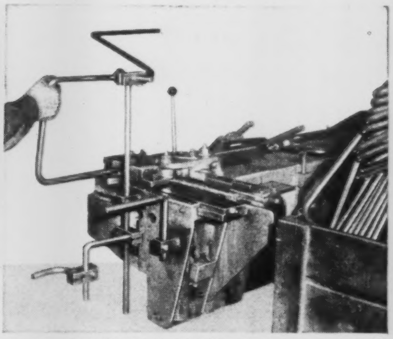




COPPER SERPENTINE BENDS—¾" O.D. x .035" copper tubing is rapidly formed on this Model ¾ into serpentine coils on a 1" clr. A simple gang-slitting operation produces 180° return bends.



WRINKLE-FREE SQUARE TUBE BENDING—Model 1 Machine, equipped with flexible mandrel and self-opening bending form, produces top quality office and hospital equipment at speeds of 250 bends per hour.



FAST ROUND-TUBE BENDING—Pines Model ¾ Machines speed production of tubular dinette and lawn furniture. Fast, automatic cycling and accurate progressive bending produce 600 to 900 bends per hour.

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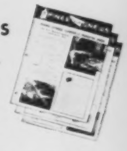
To keep abreast with bending, write for free copies of "Pines News" — gives complete data on new production applications.



PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

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WALTER R. MEYER
President, Enthone Inc.,
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American Smelting & Refining Co.
New Haven, Conn.

C. F. NIXON
Head, Electrochemistry Dept.,
Research Staff, General Motors Corp.,
Detroit

MYRON B. DIGGIN
Vice President & Technical
Director, Hanson-Van Winkle-
Munning Co., Matawan, N. J.

FORUM ON
TECHNICAL
PROGRESS

Cleaning and Finishing

Electrostatic Hand Gun Is Being Perfected

—HAROLD P. RANSBURG

Our development engineers have overcome most of the mechanical and electrical defects in our electrostatic hand gun that were disclosed by field testing. With this improved equipment, we are inaugurating an expanded project for producing and field testing new spray guns. It is our hope that before another year has passed we will have this tool in substantial production.

One of the Big Three automakers is installing a more completely automatic No. 2 Process unit for applying the prime coat to auto bodies. It is designed to automatically adjust itself to accommodate different body styles.

New Detergents Developed For Ultrasonic Cleaning

—WALTER R. MEYER

Applications of ultrasonic generators to clean metals increased last year. New detergents specifically for the process were produced.

Due to the rapid and widespread use of epoxy modified enamels, many new strippers (particularly those of an acid nature) have been developed to remove these coatings. Other strippers were generally unsuitable for such applications.

Simultaneous cleaning and oxide removal from iron and steel with alkaline detergents containing chelating agents found increasing acceptance. New cycles were offered for cleaning and acid dipping brass and zinc base diecastings to give bright surfaces and high adhesion of the electrodeposited coatings.

Accelerated Corrosion Tests Promise Better Plated Parts

—C. F. NIXON

Improvement in the corrosion resistance of plated parts used on car exteriors is on the way.

Advances will come in a number of areas: Better plating baths and better plating bath maintenance; more effective use of periodic plating current alteration techniques; multiple coatings; other ways to impede deposit penetration by corrosion pitting; better racking methods; and better design of parts for plating.

Last year saw the emergence of two reasonably reliable accelerated corrosion tests—the Corrodkote test and the copper chloride, modified acetic acid, salt spray test. Both are being developed by the American Electroplaters' Society's Research Project 15 Committee.

Double Nickel Electroplates Will Be Used More

—MYRON B. DIGGIN

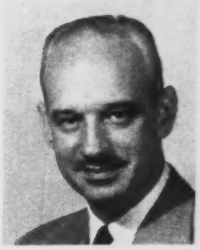
There has been an appreciable expansion in the use of aluminum for automobile trim and architectural products. Many types of surface finishes are being applied for decoration or protection. For automotive trim, anodizing to produce a protective film 0.0002 to 0.0003 in. thick, which is often dyed for color styling, is commonplace. The industry is watching the performance of these components closely to see if they will give satisfactory service.

With nickel anode supplies freer,

G. A. LUX
Technical Education Director,
Oakite Products Inc., New York

C. C. MARCH
Vice President & Genl. Mgr.,
Coated Abrasives Div.,
Minnesota Mining & Mfg. Co.,
St. Paul

A. D. DUNCAN
Vice President, Glidden Co.,
Cleveland



H. L. BENNER
Electrochemicals Dept., E. I.
du Pont de Nemours & Co.,
Wilmington, Del.

there is a tendency toward all-nickel coatings on steel in place of combination copper-nickel coatings.

The more protective double nickel (duplex deposits) has been used to a considerable extent during the last few years, but new processes for their application and further studies of their beneficial properties will tend to extend their use markedly during the coming year. Previously used only on steel, the double-layer coatings are now being applied over zinc diecastings with benefits in corrosion protection.

Ultrasonics Comes to Fore In Cleaning Mechanization

—G. A. LUX

The trend toward further mechanization of metal cleaning is expected to continue. New installations in the planning stages show a movement away from batch-type operations. Greater applications of conveyorized, fully-automatic cleaning, rinsing, pickling, and surface treating processes are in prospect.

The use of ultrasonic energy in cleaning and pickling has advanced considerably. All signs point to much greater expansion of this effective means of improving cleaning processes. Ultrasonic cleaning is rapidly becoming one of the standard, commercial cleaning methods. Despite a relatively high cost of installation, improved cleaning and reduction in processing time and cost more than justify the capital investment.

Indications are that the air conditioning of new plants will continue. To reduce air conditioning costs, development of new cleaning materials that will perform at much lower temperatures than previously considered necessary, may be expected.

Co-operation Can Solve New Finishing Problems

—C. C. MARCH

Today's dynamic industrial system is faced with more finishing problems than it will be possible to solve with new products or radical new methods. The situation will require what we call down-the-line co-operation, involving the basic metal producer, the metal fabricator, the machinery builder, and the coated abrasive manufacturer.

We have found that answers do not always lie in something new; they often come from knowing how to adapt existing facilities to the solution of new problems.

In our new 3M movie "A Challenge for Steel," we place heavy emphasis on what might be called industrial togetherness. By pooling knowhow, experience, personnel, and facilities, we are convinced the challenges can be met.

New Water Base Paints Are Winning Acceptance

—A. D. DUNCAN

The practical application of emulsion chemistry has focused attention on a new class of paint products. These water reducible coatings require no highly volatile solvents for thinning, which eliminates the possibility of fire or explosion. Savings are often an additional benefit.

The coatings have already found acceptance as finishes for acoustical tile, bed and seat springs, numerous automotive parts, and other fabricated metal products. All industrial finishes may some day be water reducible.

Chrome Finish Lasts Longer As Result of New Research

—H. L. BENNER

Research by makers of electroplating chemicals has improved cyanide electrolytes. They are used extensively in applying the copper layer in chrome-plated decorative parts in the automotive, appliance, and hardware industries. New leveling baths, because of their ability to plate selectively in polishing marks, are expected to contribute to better service life of plated parts. New bright copper baths are an important aid in producing attractive, corrosion resistant, chromium plated articles of all types.

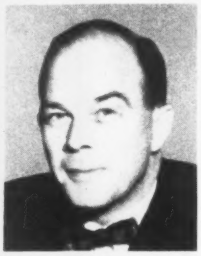
These new cyanide electrolytes, which use special addition agents in carefully controlled amounts, require cyanide chemicals of highest quality. Sodium and potassium cyanides of almost reagent grade purity are available. Potassium cyanide, for example, has a minimum specification of 98 per cent, but typically contains 98.3 per cent KCN. The "sulfide" content is typically 1.5 ppm.

Among the new chemical materials made available for modern plating is the double salt of sodium and copper cyanides. This is readily soluble, and contains sodium cyanide and copper cyanide in the proper proportions for making up and maintaining cyanide copper baths. The

H. L. KELLNER
Technical Director, Lea Mfg. Co., Waterbury, Conn.

H. C. IRVIN
President, Allied Research Products Inc., Baltimore

ROBERT G. HALL
Special Engineer, Pangborn Corp., Hagerstown, Md.


GORDON RICE
Equipment Engineer, Turco Products Inc., Los Angeles

double salt offers definite advantages of convenience, control, and high purity of critical lead and sulfide contents.

Unit Finishing Costs Cut With Automatic Polishing

—H. L. KELLNER

In polishing and buffing, the trend toward automation continues at an accelerated rate. More manufacturers are willing to make the investment in automatic equipment to cut down their unit production costs.

Further progress depends upon improvements in equipment and compositions required for buffing and polishing wheels; and advances must be made in the design of parts to make them more adaptable to finishing on automatic equipment. Advances are being made in those areas.

Because of ease of controlled application, more interest is being shown in liquid buffing compositions for use on automatic machines. We are fast approaching the time when liquid compositions will be the standard for all buffing now done manually.

Chromate Conversion Coatings To Get Wider Application

—H. C. IRVIN

Chromate conversion coatings for nonferrous metals have come a long way. Their good corrosion resistance has made them useful both as a final finish and as a base for paint on all types of components and assemblies.

Methods of application have been simplified compared with processes they have displaced. They have replaced chromic acid anodizing for aluminum, providing more effective results at less cost. Bright treatments for zinc have made the use of this inexpensive metal possible—otherwise, a copper-nickel-chrome finish would be necessary.

New theories of application are being developed. The principles involved may be applicable to ferrous metals, and exploratory work in this direction has begun. The application of knowhow to chemical polishing of nonferrous metals is opening the way to further developments. It will replace or supplement the more costly mechanical methods of polishing.

Blast Descaling Efficiency Improved by Developments

—ROBERT G. HALL

Shotblasting is a versatile tool which is easily adaptable to any automated processing line. It's being used to clean sheets, strip, billets, and slabs of stainless, carbon, and silicon steels, titanium, and zirconium. The wire industry uses it to clean in single or multiple strands for black wire, or following a patenting furnace. Welded pipe producers blast pipe skelp margins to provide a clean surface for electric welding. Structural steel fabricators have found it a good way to remove mill scale prior to painting. Manufacturers of automotive and truck frames blast descale, then cold form.

Recent developments which have increased the efficiency of blast descaling include:

1. Use of high capacity centrifugal wheels. They can supply up to 100 hp with an abrasive flow volume of 160,000 lb of steel shot per hour per wheel. It means faster descaling line speeds and smaller machines.
2. Use of premium metal, alloy wheel parts, and cabinet wear plates. They reduce maintenance costs.
3. Improvements in steel abrasives. New facilities for producing steel shot will come into operation in the near future. They will provide the metalworking industry with a more carefully controlled steel abrasive.

Coating Protects Parts During Heat Treatment

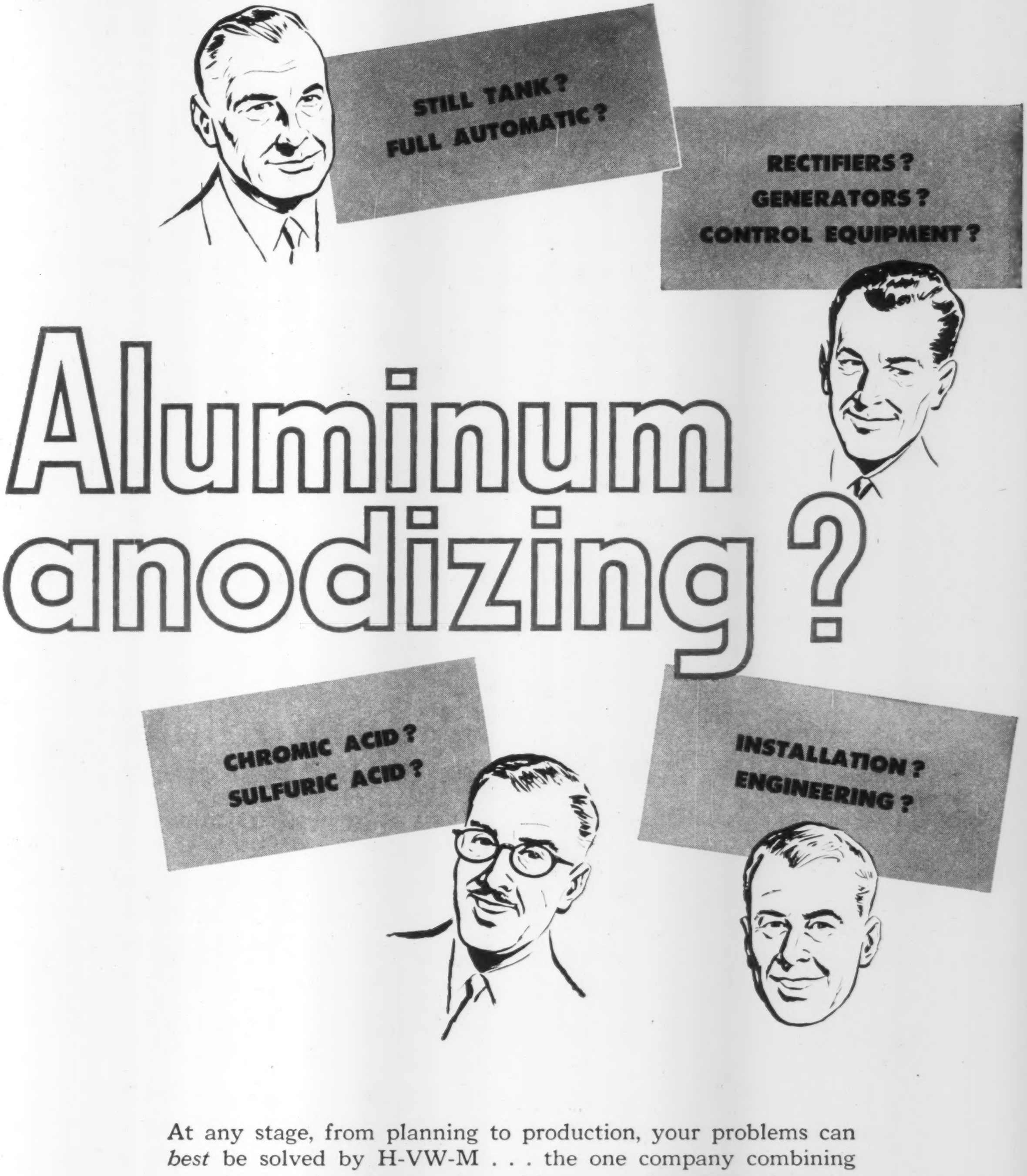
—GORDON RICE

The past few years have seen a great increase in the use of titanium, stainless steels, and nickel and cobalt alloys as structural members for aircraft and missiles. During their heat treatment, a heavy oxide coating is formed which is difficult to remove. It also causes damage to dies by galling and seizing during hot forming.

Inert atmosphere furnaces prevent scaling, but parts are difficult to handle because of their variety of sizes and configurations. A chemical coating material has been developed which will allow parts to be processed in standard furnaces without the deleterious effects of heavy oxide scaling.

Parts are first precleaned thoroughly to remove surface contamination, such as oil and grease. Next, the entire surface is treated with the antioxidant coating. It is applied either by spraying or dipping—0.0002 in. is needed for protection. After the coating has air dried for 10 to 15 minutes, parts may be heat treated.

The antioxidant coating reduces the amount of scaling. It also prevents intergranular attack on pre-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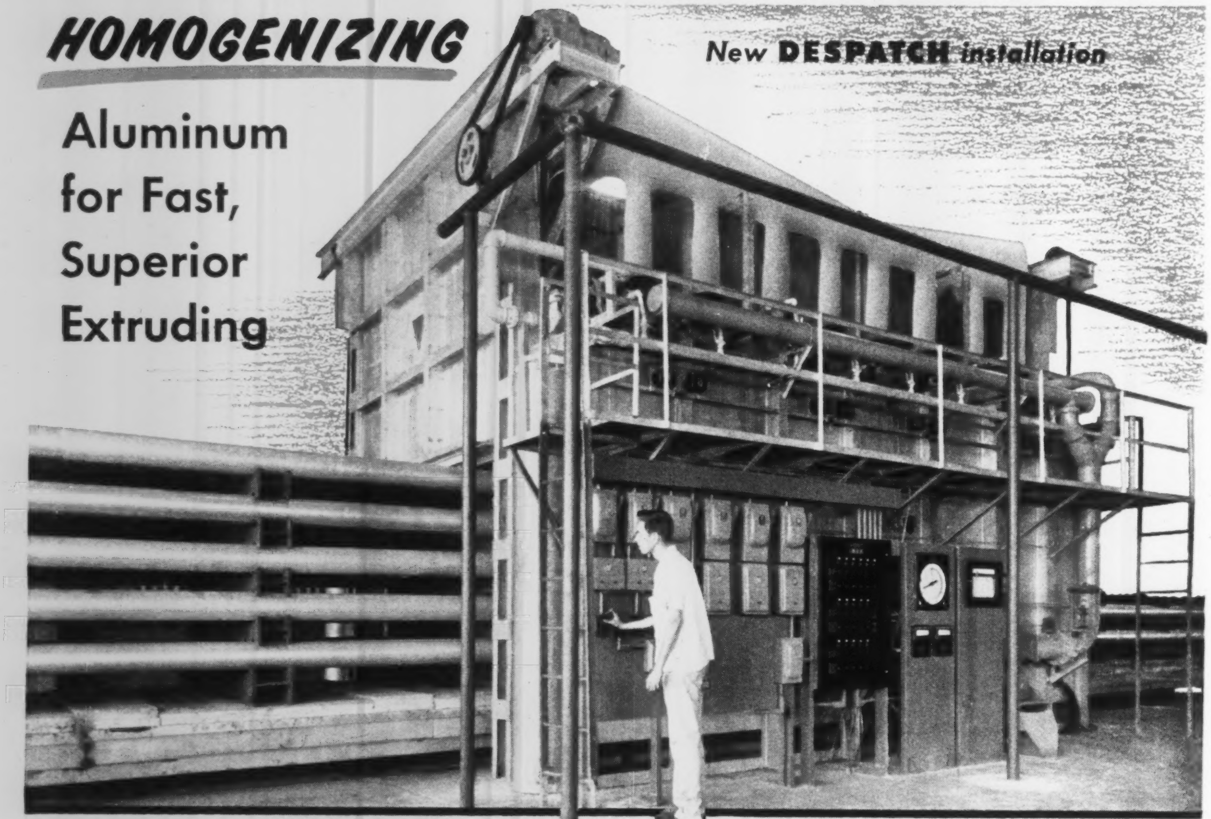
HOMOGENIZING

Aluminum for Fast, Superior Extruding



GULFPORT WORKS—ALUMINUM DIV. OLIN MATHIESON CHEMICAL CORP.

now produces substantial quantities of extrusions for window frames, trailers, architectural applications etc.

Fast Extruding Now Possible

Before, Olin Aluminum had problems extruding their non-homogenized alloys. The "logs" had to be slowly and cautiously extruded in order to minimize unsightly tear marks. These surface imperfections were a practically unavoidable result of extruding aluminum having uneven construction.

Now, by thoroughly homogenizing their aluminum alloys in the new DESPATCH furnace shown above, the company extrudes at a rapid rate, boosting production of extrusions with uniform physical construction, and with a superior surface quality.

Let DESPATCH *help you!*

PRECISE TEMPERATURE IS NEEDED

This indirect gas fired, radiant tube recirculating DESPATCH furnace holds a temperature of 1100°F. within very close limits enabling the Olin Aluminum Gulfport Plant to produce an even, homogeneous blend in their aluminum alloys for extruding.

A typical load is 50 to 60 aluminum "logs", each weighing about 1,000 pounds, 18 ft. long with diameters of 6", 8" and 11".

Each load stays in the homogenizing furnace 16 hours. Once the logs are in the furnace no supervision is necessary. Constant temperature is assured, thanks to efficient firing and sensitive automatic controls.

Write for complete information on Despatch aluminum solution heat treating furnaces, homogenizing furnaces, aging ovens, etc.

Write for Bulletin No. 81K

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OVEN COMPANY

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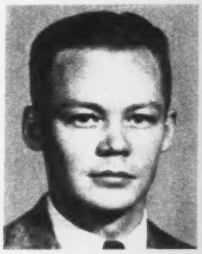
J. O. J. SHELLENBERGER
Vice President, Marketing, American Chemical Paint Co., Ambler, Pa.



F. G. LOW
Electrochemicals Dept., Chlorine Products Div., E. I. du Pont de Nemours & Co., Wilmington, Del.

S. SYDNEY MINAULT
Vice President & General Manager, NRC Equipment Corp., Newton Highlands, Mass.

cipitation hardenable steels, such as 17-7 PH. It prevents decarburization of 347 stainless, Inconel, and Inconel-X. Oxygen pickup in titanium alloys is reduced.

New Crack-Free Chromium, Plastisols Ready for Use

—H. D. McLEESE

Crack-free chromium is available in bright and dull finishes. It eliminates the minute cracks that develop in conventionally plated chromium when deposit thickness exceeds 20 millionths of an inch. The new process is expected to find wide acceptance for automotive bumpers and trim and on parts such as hydraulic cylinders and washing machine shafts.

Economical chromium plating of small parts (such as screws) can be done in a new continuous plating barrel. In most cases, it outperforms the batch-type barrel we introduced several years ago.

A new bright cyanide copper plating process provides faster plating speeds and simplifies operation and control. Finishes ranging from mirror bright to any lesser degrees are readily obtained without buffing. The process can be used for still, automatic, or barrel plating.

A new plastisol makes it possible for corrosion and abrasion resistant coatings to be spray-applied to 40-60 mil thicknesses per coating. It's used for tank linings and a variety of other applications.

Still newer are vinyl dispersion coatings which offer either textured or smooth finishes, combining highly attractive appearance with amazing toughness and durability. Applied by spraying, they are being used as finishes on business machines, where they outlast other textured finishes as much as 10 to 1. Other types of equipment to which they are well suited include office furniture, television cabinets, electronic equipment housings, and power tools.

Research and Development Are Keys to Progress in '58

—J. O. J. SHELLENBERGER

We expect consumers to be more dissatisfied with conventional processes and to expect new, simpler, higher quality, and more economical procedures.

We expect to see more need for finishing chemicals in the building industry as the trend toward the use of metal in building continues.

We see 1958 as a year in which research and development must be productive if we are to continue to grow in our specialized markets. With research, development, and sales working as a team, we believe 1958 will be a reasonably good year.

More Metal Fabricators Turn to Vapor Degreasing

—F. G. LOW

Vapor degreasing, as an integral part of metal fabricating operations, continued to find increased applications last year. Equipment makers have added to the versatility of the process with specialized designs to handle increasingly complex parts and to permit integration with automated production lines.

The demand for metal parts with scrupulously clean surfaces for such applications as electronic equipment, computers, and missiles has increased the use of vapor degreasing. In some cases where soils are tenacious ultrasonic energy is used.

More metal fabricators have shown a change in attitude toward metal degreasing. For example, the ASTM, working with industry, is planning to explore the possibility of setting up performance standards to cover vapor degreasing and allied operations.

New Finishing Possibilities Offered by Vacuum Plating

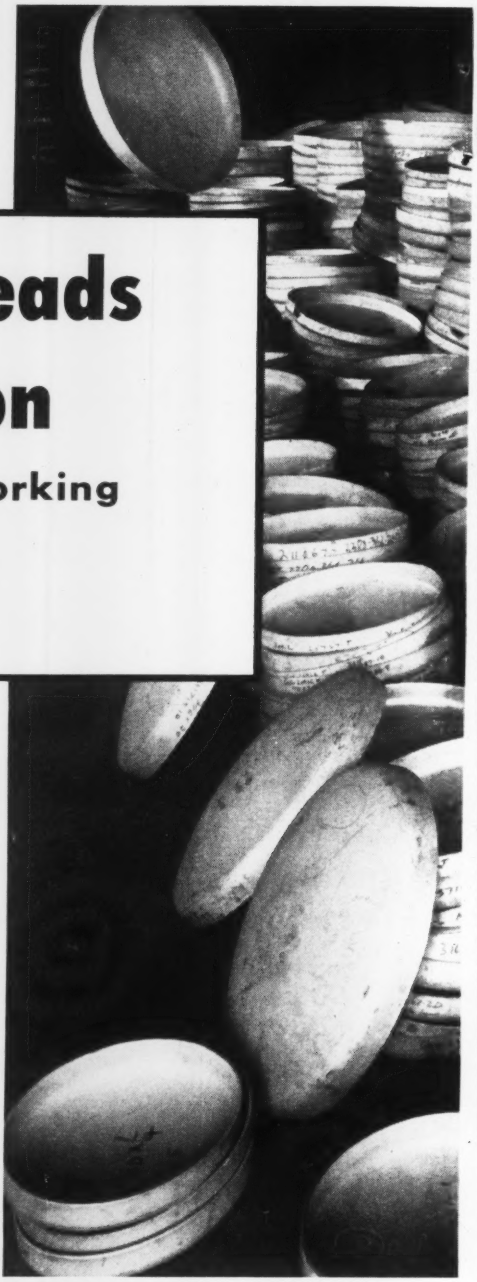
—S. SYDNEY MINAULT

Durable, corrosion resistant, metallic coatings, applied without the problems of hydrogen embrittlement, are promised by a new technique: Thick films of aluminum, chromium, or cadmium are deposited by high vacuum evaporation.

The process can be applied to a wide range of metals, alloys, ceramics, and glass. It can be developed on a continuous basis to coat sheets, strip, wire, and other mill forms, or it can handle fabricated parts on a batch basis. Ultimately, its cost is expected to be competitive with electroplating, chemical reduction, and hot dipping—although it is likely to command a premium until it reaches the production scale.

Initial industrial applications will be those for which no other satisfactory coating process is available. Aircraft landing gear and other parts made of high heat treat alloys, which suffer from hydrogen embrittlement when electroplated, can be effectively protected against corrosion. The

(Please turn to Page 362)



Stainless Steel Heads stocked by Carlson

- ▸ **keep your working capital working**
- ▸ **save you money**
- ▸ **give you prompt delivery**

It pays to design and build equipment with this stock in mind. You don't have to tie up your working capital in shell plates, pipe and fittings while you wait eight or ten weeks for tank heads. You'll save money by using the less expensive stock sizes that are pressed, rather than odd sizes that must be spun. You also save time when you need stainless steel heads for new construction or for emergency replacement.

The Carlson stock is made up of ASME and Standard flanged and dished stainless steel heads. They range from 10″ O.D. through 72″ O.D., in 6″ increments, $\frac{3}{16}$″ through $\frac{3}{8}$″ Gauge, in Types 304, 304-L, 316, and 316-L. All are fully annealed and pickled after forming to provide maximum corrosion resistance. Flanges can be machined to your specifications in a matter of days.

In addition to maintaining the country's largest stock of stainless steel heads, dies are available for pressing heads in other grades of stainless. Special sizes can be spun when required. To get all the facts on this unusual Carlson service, mail the coupon and we'll send you the latest Heads File-Folder and Stock List.

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Stainless Steels Exclusively

THORNDALE · PENNSYLVANIA

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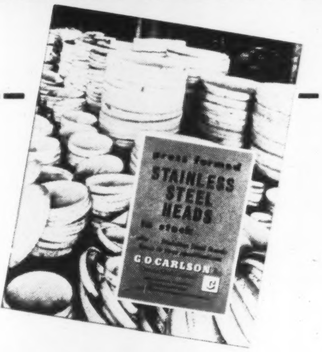
This Carlson Stainless Steel Heads File-Folder includes lists of Dies for press forming and information on flange machining.

PLATES • PLATE PRODUCTS • HEADS • RINGS • CIRCLES • FLANGES • FORGINGS • BARS and SHEETS (No. 1 Finish)



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STEEL
HEADS
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CHARLES L. FAUST
Battelle Memorial Institute,
Columbus, Ohio

WILLIAM P. INNES
Technical Director,
MacDermid Inc.,
Waterbury, Conn.

J. C. LUM
Manager of New Products,
Metal Processing Dept.,
Pennsylvania Salt Mfg. Co.,
Philadelphia

ability of the process to deposit an anodizable, adherent aluminum coating should lead to the development of many new applications.

Package Job Offers Plusses In Metal Processing Field

—A. E. CARPENTER

Our emphasis, through our servicemen on the road, is on the advisability of doing a "package job" when buying processing and finishing materials. For example, a cleaner, blackening salt, and final rust preventive are used in blackening steel. All should be procured from the same supplier, who will help engineer the job, and be responsible for results.

In the field of drawing and forming, a new compound which acts as a forming lubricant and produces an iron phosphate film on the work has been developed. This is produced from a chemical base which is reactive to ferrous metal. It is light in viscosity and easily applied and cleaned off after forming. This type phosphated film aids in later processing, protection, or paint adhesion.

Rapid action phosphating, on a controllable scale, is close to perfection in the chemical surface treatment of metals.

Surface Condition Critical In High Temperature Coatings

—CHARLES L. FAUST

The need for protection against high temperature deterioration continues to set the pace for metal finishing. Designers and fabricators will need to give close attention to the relationship between method of finishing and the properties of a metal surface.

Finishing methods that cut, rip, tear, or smear the surface leave it with different properties, compared with methods that do no mechanical work. The nature of alloy interfaces formed by interdiffusion of coating and basis metal at service conditions must be considered. Diffusion alloying can improve the properties of a coating. Where diffusion alloying is detrimental, barrier layers will be used. These aspects of metal finishing comprise a new technology—surface metallurgy.

Noble metals, such as gold, rhodium, and platinum, are giving practical answers to protection in severe service. Layer coatings with or without diffusion alloying continue as outstanding prospects for solving metal finishing problems.

New Bright Copper Plating Process Offers Many Plusses

—WILLIAM P. INNES

Our bright copper plating process (cyanide) was introduced early last year. It has been production proven. Control is simplified by the use of one brightener. Roughness is greatly reduced by utilizing nonmetallic additives which do not film the anodes.

The process utilizes current interruption which also reduces roughness, results in more uniform deposits, and increases the tolerance to common impurities, such as chromium and organics. Current interruption also permits higher current densities without burning, which means faster metal deposition.

The development of an economical metal stripper has started a trend in industry from phosphor bronze to stainless steel tips for plating racks.

Rejects in chromium plating are being reprocessed through the use of metal stripping. The process strips chromium, and also activates the nickel so that the work may be replated with chromium without buffing or further activation.

Increased efficiency in spray cleaning is possible as the result of development of low-foaming compounds. These new metal cleaners may be used at high concentrations without foaming.

Cleaners for Specific Jobs Will Get More Emphasis

—JOHN C. LUM

The high cost of labor and materials means that there must be fewer rejects caused by poor cleaning in plating, enameling, or painting lines. Most manufacturers must obtain such improvement with equipment they have, relying upon improved cleaning products.

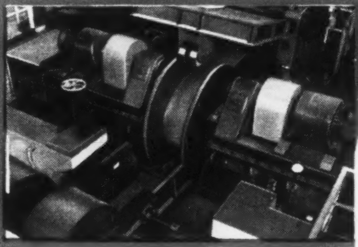
Almost completely gone are the lines using a single commercial chemical, such as caustic soda. Most cleaners now depend upon the synergistic influence of a multitude of materials.

The increased use of aluminum has created a demand for many new cleaners in this field—acid and alkaline, etch and nonetch. Proper cleaning prior to phosphatizing is receiving more attention. The composition of the cleaner can produce different results in subsequent phosphatizing treatments.

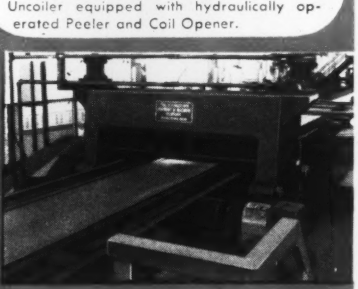
In 1958, look for the introduction of more cleaners designed to do a specific job, with emphasis on performance and economy.

auxiliary equipment *for* ELECTRIC WELD PIPE MILL

Bethlehem Steel Company's new Pipe Mill, Sparrows Point, Md. All Auxiliary Equipment by "YF&M", except Edge Conditioning by Wheelabrator. Mill Proper by Yoder.



Only 20 seconds required to enter 30,000#, .500" thick x 54" wide Coils from Conveyor into Leveller, using this rugged Cone Type Uncoiler equipped with hydraulically operated Peeler and Coil Opener.



Heavy duty Up-Cut Shear equipped with Fawick Air-Flex Clutch. Shear travels hydraulically and automatically cuts at speeds of 45—180 FPM.

Over Hung Mandrel Type Side Trimmer equipped with eccentric sleeves on both top and bottom arbors to insure best possible edge for welding operation and longer knife life.

Another example of how "YOUNGSTOWN" serves the steel industry

This modern mill utilizes "YF&M" Auxiliary Equipment to produce 4½"—16" Dia. Electric Weld Pipe. Material: Hot Rolled Skelp Steel; width: 15"—54"; thickness: .125"—.500"; coil weight: 30,000#; line speed: 45—180 FPM. Advanced design and rugged construction for highest efficiency are features of this mill and its precision equipment.

YOUNGSTOWN Auxiliary Equipment built for this new Pipe Mill

- CONE TYPE UNCOILER
- COIL PEELER
- 7-ROLL ROLLER BEARING LEVELLER
- TRAVELING UP-CUT SHEAR
- SIDE TRIMMER
- SCRAP CHOPPER
- PINCH ROLL STANDS
- TABLES WITH SIDE GUIDES

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CLEANING AND FINISHING

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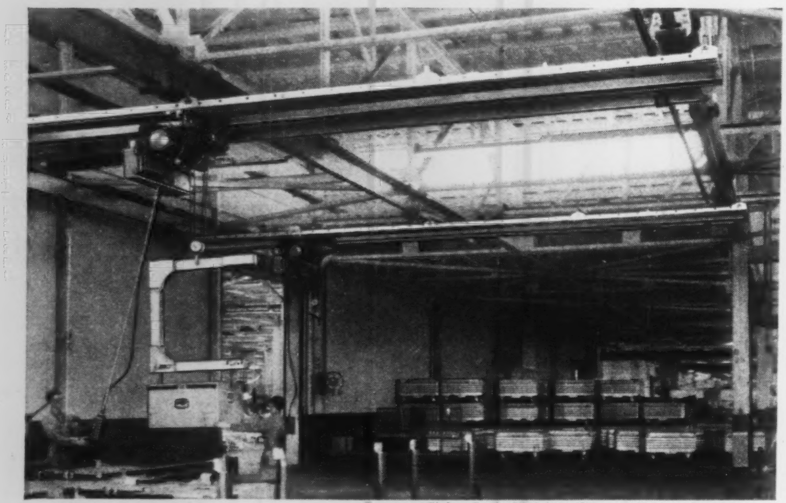
Assistant Manager, Industrial Equipment Div., Detrex Chemical Industries Inc., Detroit

G. W. HULDRUM
Manager, Chemical Sales Div., Shell Chemical Corp., New York

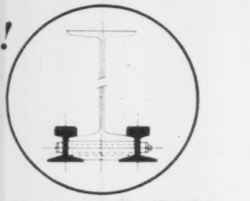
R. C. GIBSON
Assistant Vice President, Parker Rust Proof Co., Detroit

L. C. SORENSON
President, Kelite Corp., Los Angeles


Courtesy Fisher Body Division, General Motors Corporation

92 ABELL-HOWE CRANES

for automobile body builder!


Abell-Howe 10-ton crane bridges at Fisher Body are specially designed with Timken bearing equipped flat tread wheels operating on 160# ASCE crane rails fastened to lower flange of I-beam runways . . . no better design for heavy service!

Specifically, seventy 10-ton cranes, ten 5-ton cranes and twelve 2-ton cranes . . . serving the receiving, production facilities, storage, maintenance and repair, and shipping areas in two separate plants.

The entire job was completed in good order—equipment was accepted promptly upon completion, and there have been no reported cases of malfunction.

Granted, Abell-Howe does not write orders like this every day. In fact, our business has been built on the satisfaction of single crane buyers. Point is, these cranes were purchased in *quantity* simply because Abell-Howe has the quality construction as well as the conservative price!

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S-110 SINGLE GIRDER CRANES
Underhung and Top-Running models. Cap. 2,000 to 10,000 lbs.

C-110 CRANEMASTER CRANES
4 basic types to suit all building conditions. Cap. 3 to 20 tons.

ABELL-HOWE COMPANY *7747 W. Van Buren St. Forest Park, Ill.*

Examine Your Total Costs In Figuring Metal Cleaning

—T. J. KEARNEY

With cost of operation the major concern of management, over-all costs of cleaning must be considered. To do this it is necessary to examine not only initial equipment cost but also total cost of operation and return on invested capital.

Quality and uniformity of cleaning results must be given serious attention as a high percentage of rejects can result in astronomical costs.

In arriving at total operating costs, the following items must be considered: Heat, water, chemicals, and maintenance. On this basis, a safer investment can be made.

Epoxy Resins Are Versatile; It's Factor in Their Growth

—G. W. HULDRUM

The versatility of epoxy resins, plus the wide range of catalysts that are available, have enabled users to plan for superior coatings, adhesives, laminates, and pottings.

In the coating of band instruments, for example, a clear epoxy has replaced conventional lacquer. The epoxy provides greater resistance to wear and to attack by perspiration acid.

Epon resin adhesives are already well established for the bonding of wings and large fuselage honeycomb segments. An epoxy-phenolic adhesive bonds aluminum skins and core to meet the high performance requirements of jet aircraft.

In the potting of instrument transformers, heavy asphalt insulation applied manually has been replaced by epoxy encapsulated primary and secondary windings, with epoxy resins forming the outside. This gives a product that's better and more attractive.

J. V. DAVIS
Chief Engineer, Udylite Corp.,
Detroit

Equipment Design Aided By Fundamental Studies

—J. V. DAVIS

New developments in electroplating require re-evaluation of accepted rules for building equipment.

An example is the recent interest in air agitated, bright nickel plating solutions. It has made the designer reconsider some of his rules in assigning tank dimensions.

Our first step was to study the effects of air agitation in an experimental tank with transparent sides. Experiments enabled us to investigate such problems as manifolding, bubble paths, types of orifices, depth, pressure, viscosity, density, and temperature. Some accepted standards were found to be wrong, and a number of unsuspected limitations were discovered by the study of slow-motion pictures. After we edit the pictures, we expect to make them available to interested groups.

Cold Phosphating System Cuts Finishing Costs

—R. C. GIBSON

A new cold spray phosphating system for steel and mixed steel and zinc parts saves up to 70 per cent of heating costs. Maintenance of heating equipment is reduced, and evaporation loss is decreased.

The complete process includes an alkaline cleaner which operates in the range 70 to 120° F, with the phosphate coating solution used at 105 to 110° F. Water rinses are used at room temperature.

This new cold system has been production tested. For example, the savings in heating costs can run as high as 10 to 12 cents per automobile body; on a domestic appliance, such as a refrigerator or washing machine, 4 to 5 cents per shell. The quality of the coating as a paint base is equal to that obtained by conventional hot systems.

It is now possible to produce both green and gold surface conversion coatings on aluminum by chemical methods without the use of electricity.

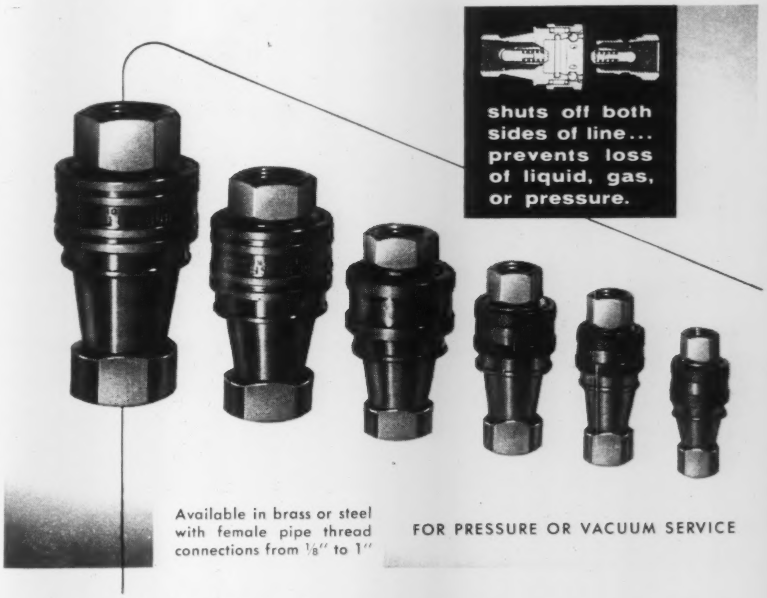
Two New Paint Strippers For Epoxy, Acrylic Finishes

—L. C. SORENSEN

A hot alkali paint stripper for tank use on steel has been developed. It removes most of the epoxy resin finishes in current use. It also has considerable effectiveness against many acrylic paints.

A brush-on paint stripper which can remove many of the newer finishes from a variety of metals has also been developed.

The products are becoming increasingly important with greater use of the newer and more chemically resistant finishes.



shuts off both sides of line... prevents loss of liquid, gas, or pressure.

Available in brass or steel with female pipe thread connections from ⅛″ to 1″

FOR PRESSURE OR VACUUM SERVICE

HANSEN QUICK-CONNECTIVE TWO-WAY SHUT-OFF COUPLINGS

Both ends of line are positively sealed when you disconnect a Hansen Series HK Two-Way Shut-Off Coupling. To connect, just pull back sleeve and push Plug into Socket. To disconnect, merely pull back sleeve. No tools required. Identical valves in Socket and Plug permit free flow of gas or liquid when Coupling is connected—practically eliminate spilling of liquid or escape of gas when disconnected.

WRITE FOR THE HANSEN CATALOG

Here's an always ready reference when you want information on couplings in a hurry. Lists complete range of sizes of Hansen One-Way Shut-Off, Two-Way Shut-Off, and Straight-Through Couplings—including Special Service Couplings for Steam, Oxygen, Acetylene, etc.

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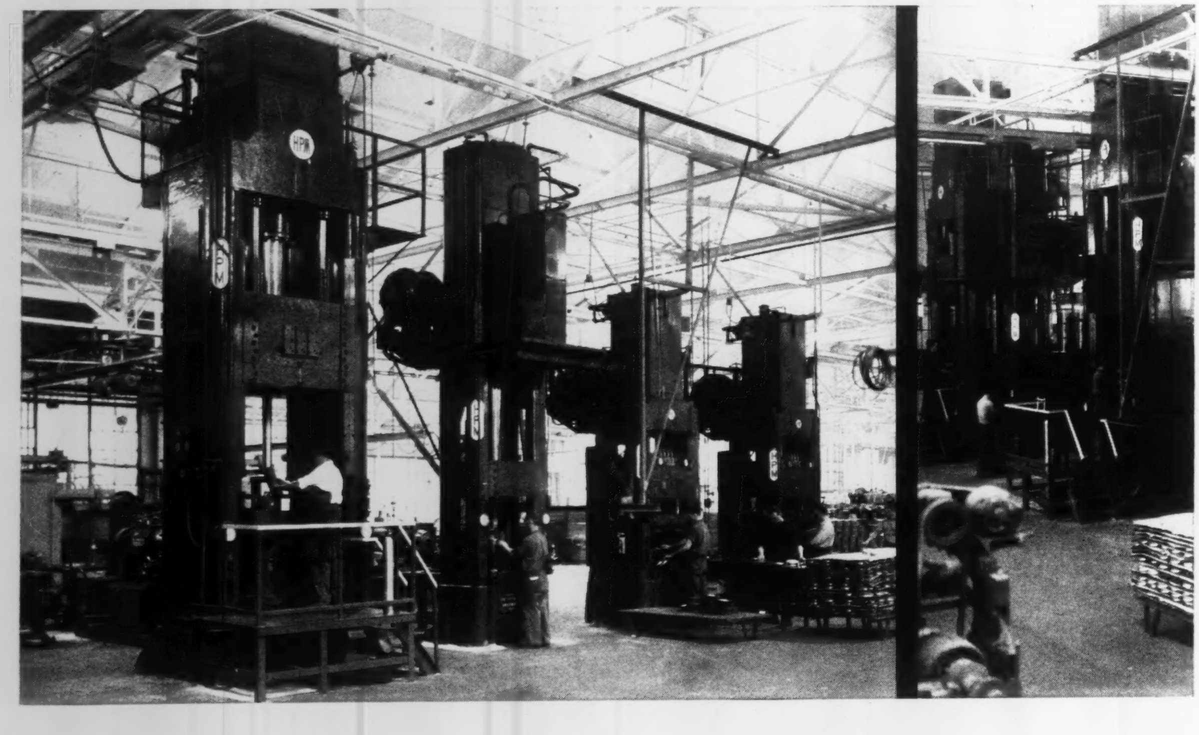
MORE H-P-Ms - IN MORE PLANTS

BROADENED LINE DIVERSIFIES H-P-M SERVICE TO INDUSTRY

Back in the early thirties, Rome Manufacturing Company, Division of Revere Copper and Brass Incorporated, began using H-P-M hydraulic presses in the manufacture of their now famous Revere Ware utensil line. Since that time, over twenty more H-P-Ms have been added in Revere plants. Literally hundreds of different dies are interchangeably used for the drawing and forming of sheet metal into the many forms used in Revere kitchen utensils. Revere is typical of industries that have adapted the principles of hydraulics—H-P-M hydraulics—to numerous metal forming operations because of their versatility, ease of maintenance and control, the infinite adjustability of tonnage, stroke and speed of ram traverse. All of these adjustments are at the operator's fingertips. Press operation for automatic and semiautomatic requirements is a matter of simple adjustment.



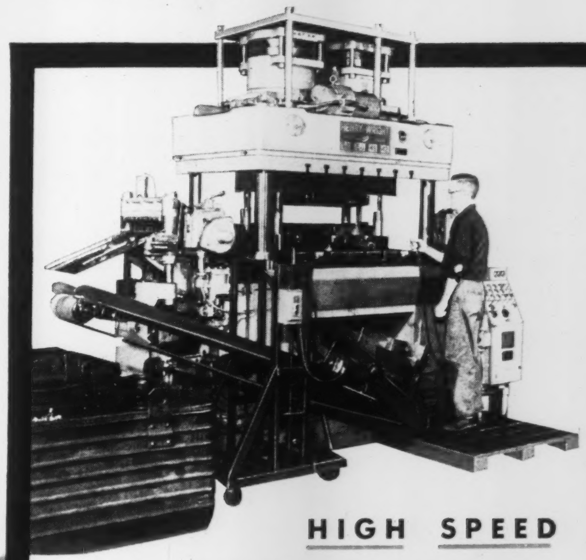
The complete H-P-M line has been illustrated and described in Bulletin 5600 and covers equipment drawing with and without die cushions, coining, embossing, straightening, rubber pad forming, forging, hot forming and trimming, and a variety of presses for the processing industries. Your request on your letterhead will send it to you by return mail.

THE HYDRAULIC

A DIVISION OF KOEHRING

-DOING MORE WORK

Adapting versatile H-P-Ms is a matter of tooling ingenuity and the application of experience your H-P-M field engineer will gladly supply. If your production facilities are undergoing modernization for the competitive days ahead, call in the H-P-M man in your area, or write to the home office in Mount Gilead, Ohio. Let the experience of our qualified engineers assist you at the planning stage.

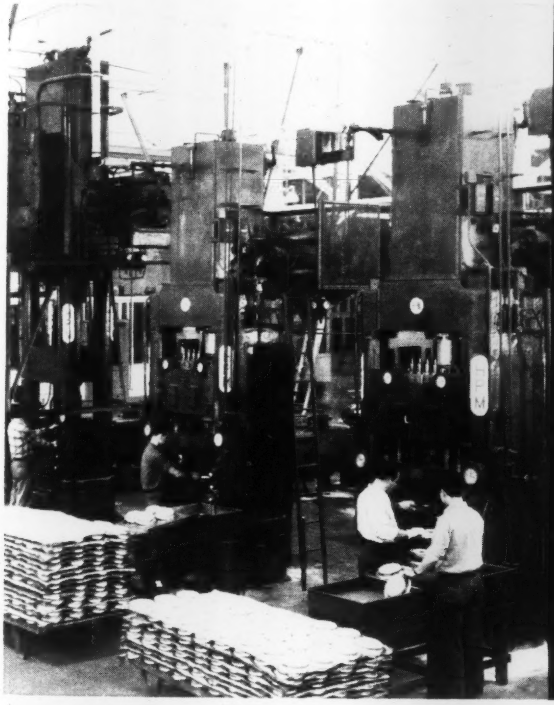


HIGH SPEED WITH BUILT-IN ACCURACY ASSURANCE

A story of H-P-M Henry & Wrights in the automotive industry

Here's a machine, one of ten designed for a large automotive manufacturer expressly for the progressive stamping of parts on high production. Double crank design supports crosshead at both ends for accuracy; underdrive operation gives a low center of gravity and a pulling rather than a pushing action. Here's a dieing machine for greater range of work with better quality control at top speeds. It's JIC designed, which means less maintenance, better service for any requirement. And it's now made by H-P-M—a leader in metalworking presses since 1877. Send for complete information today.

Henry and Wright . . .
built by H-P-M



Two different rows of H-P-M presses at Rome Manufacturing Company, Division of Revere Copper and Brass Incorporated, Rome, New York.

H801

PRESS MFG. COMPANY **HPM**

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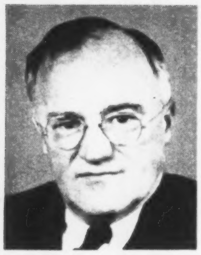
FRED L. PLUMMER
National Secretary, American Welding Society, New York

JOHN J. CHYLE
Director of Welding Research, A. O. Smith Corp., Milwaukee

LAURENCE H. FLORA
Director of Sales, Tinnerman Products Inc., Cleveland


A. F. DAVIS
Vice President, Lincoln Electric Co., Cleveland

FORUM ON
TECHNICAL
PROGRESS

Joining and Assembly

Trend to Mechanization Will Improve Weld Quality

—FRED L. PLUMMER

Total sales of the welding industry in 1957 (about $1 billion) established a record by a wide margin and confirmed the importance of the 37 basic welding processes to manufacturers and fabricators. Welding is now used for every metal in commercial use—including stainless steel sheets thinner than paper; electrical assemblies so small they must be projection welded with the aid of optical magnification; alloy steels in thicknesses of 10 in. or more; and ¼-in. aluminum at speeds of more than 100 ipm.

Outstanding developments in equipment (manual and automatic inert-gas shielded and tungsten arc processes) make possible the fabrication of zirconium cases and stainless steel piping for nuclear reactors. Special processes are being used to meet the severe requirements for aircraft in supersonic, high temperature service—including manual, automatic, dip, and furnace brazing; spot, seam, and projection welding of sheets; flash welding of engine mounts and spar assemblies; and mechanized welding of sandwich panels.

In every field there is a trend to mechanization of welding for high production, improved quality (including close dimensional tolerances), and low cost per unit.

CO_2 Continues to Gain; Faster Electrodes On Way

—JOHN J. CHYLE

The trends to automatic welding and the production application of the CO_2 welding process continue to grow. Fully automatic equipment is designed to weld light gage auto parts. Considerable effort is being made to extend its usefulness, particularly for light gage steel. Semiautomatic or manually guided CO_2 welding is also being expanded.

Improvements have been made in automatic welding heads and equipment, as well as in the wire itself. Two of its prime advantages are visual observation of the arc and freedom from cleaning after the weld has been completed.

New coated electrodes have higher deposition rates than older types. There is a marked increase in the use of the new electrode types for production welding of fillets. Some new iron powder electrodes also permit all-position welding that offers economy and superior appearance. Look for further developments in electrodes with higher deposition rates.

Fasteners Gain Appeal In Competitive Economy

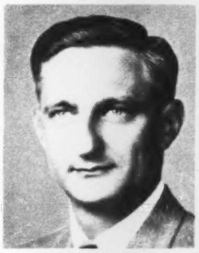
—LAURENCE H. FLORA

All markets (particularly consumer durable goods) are expected to become increasingly competitive this year. More engineered fasteners will be relied upon to reduce costs and make products more attractive.

Industry recognizes assembly as one of the most important sources of potential savings. Assembly and material handling time can be cut in half through the use of engineered fasteners. Product appearance can be greatly enhanced by eliminating visible attachments.

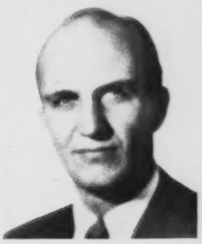
Spring tension fasteners can bring additional cost savings by eliminat-

RALPH S. BATTLES
President,
Judson L. Thomson Mfg. Co.,
Waltham, Mass.



E. F. HESS
Product Manager, Coatings & Sealers
Div., Minnesota Minning & Mfg. Co.,
Detroit

W. G. WALTERMIRE
Chief Product Engineer,
Lamson & Sessions Co., Cleveland



A. W. ARMOUR III
President, Buck Mfg. Co.,
Detroit

ing the need for welding, staking, and riveting equipment.

The time is not far off when every type product will have its own spring tension, multiple purpose fastener.

Bridge Builders Favor Welds; Progress Seen in Other Fields

—A. F. DAVIS

A recent survey of several hundred bridge designers and fabricators indicates that most steel bridges are or will be welded.

Conversion of cast iron machinery to welded steel design will also make substantial progress, although somewhat slower than in the structural field. Machine tools, printing, textile, and other processing machinery, are complex, and many factors center in the decision to use welding.

Several of the major printing press companies have turned to welding. The flexibility of welded design to permit variations for customer specifications is proving useful in tools for the automotive industry. Higher rigidity has permitted machine tool designers to use higher operating speeds with greater accuracy.

Rising Labor Costs Favor Use of Rivets

—RALPH S. BATTLES

Rising labor costs and stiffer competition have forced manufacturers to seek faster and less costly methods of assembly. Automatic feeding and setting machines make rivets a natural answer.

Multiple head machines and fixtures have contributed greatly to the reduction of handling costs. Air-driven rivet setters have opened many new avenues of application. Such machines give accurate power control on clinching, permitting riveting of such brittle materials as ceramics and glass.

Electrical contacts in rivet form are being applied more frequently by control designers. The demand for electrical characteristics has fostered many new precious metal alloys. That trend has made metallurgy more important.

New Era for Joining Foreseen for Autos, High Temperatures

—E. F. HESS

Adhesives will open new areas of design where no other fastening method is feasible. They offer improvement over some conventional joining methods.

Some structural adhesives are stronger than the metals they bond. Aluminum and magnesium can be joined more strongly with adhesives than by any other method.

Some epoxy and nitrile phenolic adhesives have tensile strengths of 10,000 psi. Some modified phenolic adhesives have shear strengths up to 7000 psi. Look for further increases in adhesive strength.

Organic adhesives can be used at 450° F if protected from oxidation. Inorganic adhesives have fair strength properties at temperatures of 800° F. More are on the way which will be strong at 1000° F.

Assembling car bodies and frames with adhesives is a possibility. Large heavy sections needed for mechanical and fusion methods of joining would be eliminated. The change would appreciably reduce car weight and provide better mileage.

Emphasis on Straight Flow In New Fastener Equipment

—W. G. WALTERMIRE

The fastener industry is meeting increased competition with plant and machine modernization and the development of new equipment. Major improvements include mechanical descaling of rod, bright spheroidizing equipment for rod and wire, and continuous flow furnaces. The emphasis is on straight product flow through high heat, quench, wash, and temper operations.

New locking and sealing fasteners continue to show up. Pressed for economy and quality, larger users are emphasizing product redesign with headed and extruded parts.

Smaller, Stronger Fasteners Are Being Developed

—A. W. ARMOUR III

Until recently, requirements for blind fasteners and lockbolts were restricted to diameters between 3/16 and ⅜ in. The trend now is toward fasteners as small as ⅛ in. and as large as ¾ in.

There is growing interest in unusual metals with improved strength at elevated temperatures. Strengths formerly obtained at room temperature are being provided at temperatures up to 900° F.

The emphasis on missile design in-

J. F. GALBRAITH
Asst. Lab. Manager, Electric Welding, Linde Co., division of Union Carbide Corp., Newark, N. J.

A. V. BODINE
President, Bodine Corp., Bridgeport, Conn.

F. R. HENSEL
P. R. Mallory & Co. Inc., Philadelphia

creases the need for smaller, higher strength fasteners. We are using these materials in one of our research programs: AM350, 17-4 PH, 431, 321, and 316 stainless steels; Vasco Jet 1000 alloy; Thermold J; 4Al-4Mn and 6Al-4Vn titanium alloys.

Fasteners with room temperature strength of about 300,000 psi can be produced. They are a part of our extensive research program.

You can look for more aluminum in automobiles, which will expand the need for quality fasteners. Another industry trend is the steel airframe which can use the ⅛ in. diameter fastener heat treated to 300,000 psi.

Exotic materials are too expensive for commercial application. The need for added strength must be met with larger fasteners made of conventional steels. New designs of Huckbolts up to 1 in. diameter are being considered to replace large diameter rivets.

One significant factor that will bear heavily on future fastener markets: Tools to install the larger fasteners rapidly. We have one which delivers 12½ tons of pulling force. It is light enough to be handled by one man. Another prototype provides tool strength of about 25 tons.

Missile Welds Hold Spotlight; Gas Chambers Are Larger

—J. F. GALBRAITH

The welding of missiles will probably hold the spotlight for some time. Objectives vary from perfect welds on thin aluminum to x-ray quality welds on ½-in. stainless steel.

Inert-gas spotwelding, with both consumable and nonconsumable electrodes, on a wide variety of materials is expanding rapidly. A new development is the use of a pilot arc to initiate the main arc. It eliminates the uncertainties of high frequency and makes possible extremely accurate control of the time cycle.

Spotwelds exceeding military specifications are being obtained. Applications include laminated joints in honeycombs. An example of the trend is a highly automated, tape-controlled machine for the Heliarc spotwelding of missile control surfaces.

Missiles, aircraft, and nuclear power are jointly responsible for the increased interest in unusual metals like titanium, zirconium, and molybdenum. Much welding is done in chambers which grow steadily in size, complexity, and efficiency. It is common to find argon or helium chambers capable of withstanding a high vacuum. Exacting demands for welding such materials are met with argon of 99.995 per cent guaranteed purity. Such a gas is commercially available at no premium.

Heliarc cutting has expanded into new fields on heavy aluminum and stainless steel. Speeds up to 20 ipm are being obtained on 3-in. aluminum and 2-in. stainless steel. Applications are presently limited to mechanized operations on such items as shape-cut parts and plates or pipe edges beveled for welding. The process works well on hafnium, zirconium, Hastelloy, and uranium.

Cites Need for Quality In Automatic Assembly

—A. V. BODINE

Technological advances in electric devices have made the automatic assembly of complex components possible.

Parts must be of uniformly high quality to get the best work from the assembly machine. Designers must think in terms of the part and its assembly. Careful study of component design is important for automatic assembly or production. Parts must lend themselves to such processes without changing the function for which intended.

Machine tool builders are spending more money for research than at any time in their history. They are keeping abreast of the products available to them from the electronics, cybernetics, electrical, and other industries. Increasing the combination of these efforts holds great promise for mechanical assembly of consumer goods in the immediate future.

Our future labor force will not be adequate to provide for our population increase. We must mechanize the production function. Furthermore, you can't meet tomorrow's competition with yesterday's machine tools.

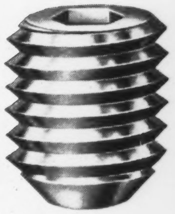
Multispot Machines Gain In Automated Lines

—F. R. HENSEL

Increasing competition has greatly stimulated a trend toward highly mechanized resistance welding. Typical is the gradual disappearance of individual, gun-type resistance welders in favor of the more highly mechanized multispot machines, coupled with mechanical work handling equipment.

The standard resistance spotwelding machine is inadequate unless it is equipped with special tooling and work handling equipment to substantially increase productivity. Welding machine manufacturers are working with those who build work handling and fabricating equipment to supply integrated, highly mechanized assembly units. The more highly mechanized units require greater emphasis on reliability of the welding operation. The result is in new concepts in controls like the Dekatron.

Newer metals (titanium and zirconium alloys) appear ideally suited for joining by resistance welding. Considerable work is being done in



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A. N. KUGLER
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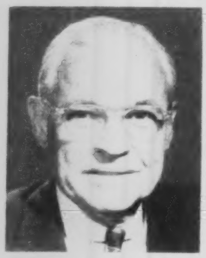


JOHN S. DAVEY
Vice President, Russell, Burdsall &
Ward Bolt & Nut Co.,
Port Chester, N. Y.

W. C. POTTHOFF
Vice President, Aeroprojects Inc.,
West Chester, Pa.

joining zirconium for use in atomic energy components.

High frequency current, on the order of 500 kilocycles, is being employed for the continuous butt-seam welding of tubing. Current is substantially less than that of conventional low frequency butt-seam welding. It is conducted into the tubing by means of small sliding shoes rather than the usual massive seam welding wheels. The high frequency process seems well suited for nonferrous materials.

Attempts are being made to combine ultrasonic welding with resistance spotwelding. A successful combination might eliminate tedious surface cleaning of aluminum alloys prior to spotwelding.

The versatility of electrical upsetting with resistance buttwelding equipment has been vastly expanded by the introduction of metal gathering machines. They produce irregular shapes from steel bars and rods. Newer electrode materials have contributed greatly to its success.

Emphasis in Welding Will Be on Refinement

—A. N. KUGLER

Emphasis in 1958 will be on the extension and refinement of welding applications rather than the development of new processes.

Applications for the gas-shielded arc processes are constantly being expanded. A good example is a recent development for converting gas-shielded metal arc welder for cutting applications. In addition, it is an effective welding tool and one of the best means for cutting of nonferrous metals.

Developments in iron powder covered electrodes continue to be outstanding. The E6030 has a deposition rate that was formerly obtained only with automatic processes. Another outstanding feature is a high quality of weld deposit.

Although gains in brazing have not been so rapid, it is a fertile field for development. The process is used to advantage in joining metals subject to high temperatures.

One of the most promising developments is the brazing of high strength honeycombs. In this application, brazing has reached a higher state of development than welding.

Cold Heading Advances As Scrap and Cost Cutter

—JOHN S. DAVEY

Fastener makers are looking at tomorrow's applications to develop assembly techniques which will be ready when they are needed.

Improvements in boltmaking machinery, hot and cold nut formers, and cold headers are bringing even greater automation and precision.

Designers are getting a better appreciation of the cost savings that can be realized by considering fasteners while products are on the drawing board. They look more to hardened and tempered medium carbon steel to replace alloy steel that has a holding capacity which is too great for many applications. They are learning that three types of threaded fasteners—machine bolts, bright cap screws, and high strength bolts—can do almost any joining job. Instead of adding another size, designers change diameter or length. There is a trend to specify standard hex heads, standard tolerances, coarse threads, and to use heavy nuts only with larger bolts.

Cold heading is gaining. Value analysis of components is showing that the method can eliminate extra operations, allow the use of fewer parts, make the component faster, or cut scrap losses.

High tensile bolts have made substantial cuts possible in the assembly time and costs of steel buildings, bridges, and similar structures. Bolting is done in the fabricating shop. High tensile bolts are also being used more in repair and replacement.

As soon as research establishes high tensile bolt characteristics under all conditions, you can look for more uses of its extra strength in a wider variety of bolted joints.

Ultrasonic Joining Processes Make Significant Gains

—W. C. POTTHOFF

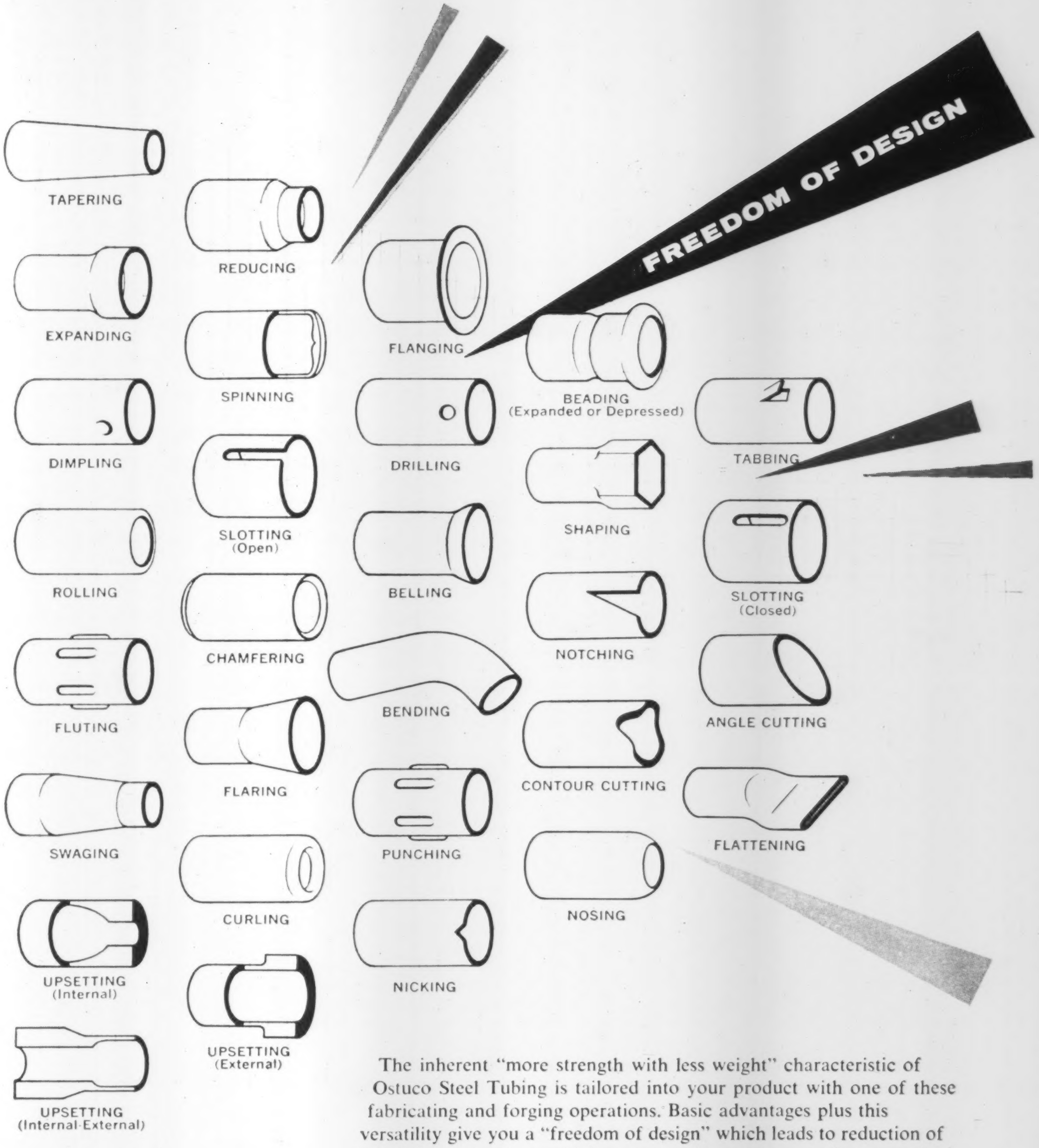
Nonfusion welds made by ultrasonic or vibratory energy are successful with similar and dissimilar metals, including aluminum, copper, molybdenum, Zircaloy, Inconel, and stainless steel.

Major developments in spot-type equipment have significantly increased the range of weldable gages. Further increases are anticipated. Aluminum sheets (1100) up to 0.080 in. can now be spotwelded with strengths that meet military specifications. New equipment joins the thinnest foils and fine wires.

Continuous-seam welding equipment for foil has been developed. Because of its high welding rates, look for the packaging field to adopt the process.

Ultrasonic fluxless soldering works well on such materials as silicon and germanium, aluminum and copper.

Ultrasonic fluxless brazing is similar to ultrasonic soldering except that it operates at temperatures up to about 1350° F. Its potential is still being explored. Joining of aluminum to aluminum and aluminum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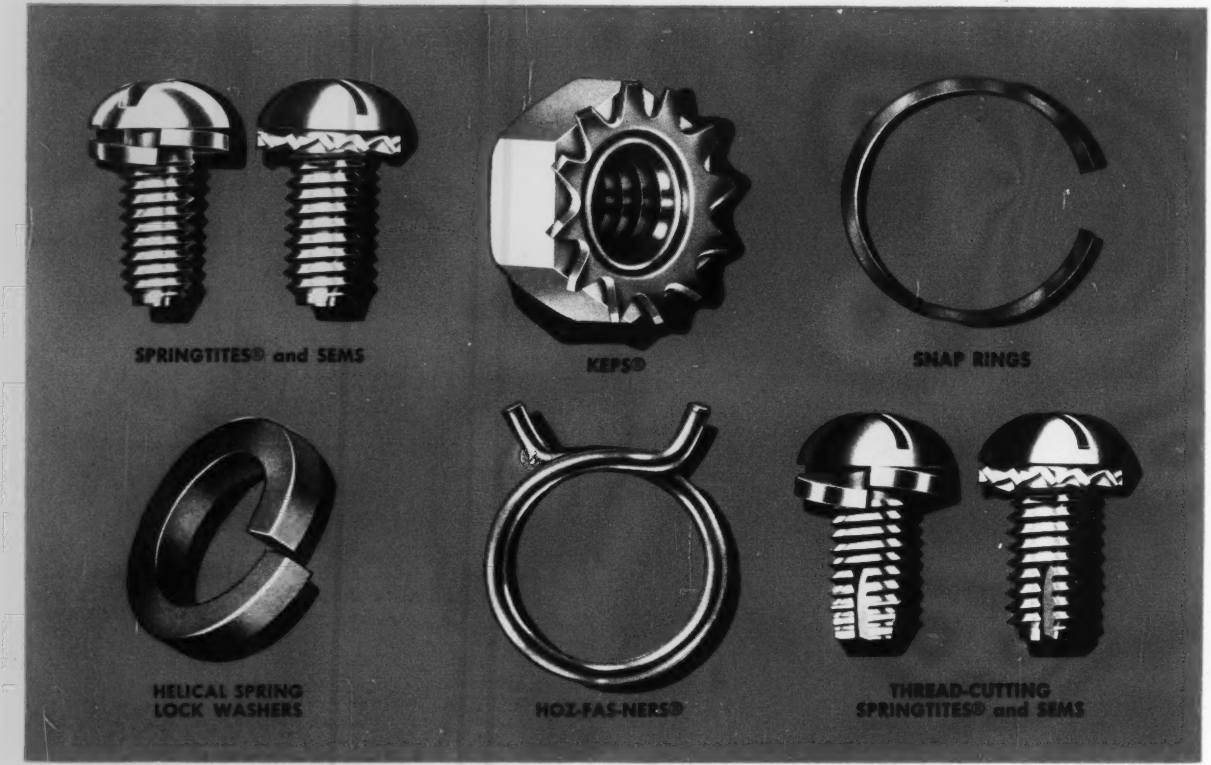
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The advantage of ultrasonic spot-welding is that no current passes through the metal. There is no liquid metal in the weld zone. Parts are joined with no burning or spattering. There is no cast nugget, so there are no intermetallic compounds formed in joining dissimilar metals.

Role of Automatic Assembly Is Getting Closer Definition

—LEONARD SWANSON

The unusual possibilities and practical limitations of automatic assembling and processing are becoming more clearly recognized.

Automatic assembly is being used by the manufacturer whose products are standardized, produced in large quantity, and require a combination of operations, such as screw driving, soldering, stenciling, riveting, and inserting.

The greater part of such applications are justified. But many justify only semiautomatic equipment. A few are not practical.

Our experience with makers of electrical parts has given us some fairly well defined factors which help in selecting such equipment.

One of the most important (and often overlooked) considerations is the indexing machine chassis. It must be accurate and stable enough to present the work in proper sequence.

The problem of inherent inaccuracy must be recognized in the straight line, chain type, indexing machine chassis. If the equipment is semiautomatic with operators at some stations, it may be acceptable as a pacing unit. For fully automatic operations, the additional expense of floating work fixtures and orienting pins must be considered.

Because of such limitations, a rotary turret appears to be a first choice. It provides positive accuracy between the holding fixture and the operating devices.

In addition to an accurate intermittent motion chassis, successful devices must do many operations. The advantages of pneumatic and hydraulic actuating devices are recognized, and their use in metalworking machines is universally accepted. Well designed, mechanically actuated devices which may call for some ingenuity by the designer are in many cases the most satisfactory means to positive actuation in automatic assembly machines. Such devices have long been accepted in making lamps, tubes, and other electrical components.

Studwelders Save Steel, Lighten Construction Design

—ROBERT C. SINGLETON

We are anticipating increased acceptance of studwelders in industry. To meet expected needs, tools for large and small studs have been developed to meet specialized requirements more effectively. Power sources with capacities up to 2500 amperes and 50 volts, suitable for welding 1-in. studs, are available.

The developments have given further impetus to the use of concrete and steel designs in bridge and building construction. Studwelded shear connectors are used extensively to simplify design and substantially reduce fabrication and erection costs. Such techniques permit sizeable savings in steel tonnage and make it possible to reduce beam and slab depth, and to increase column spacing, for more usable cubeage.

Composite bridges have greater load capacity and toughness than noncomposite structures. Rolled sections can be used for longer spans. Beam depth can be reduced. As a result, approaches are shorter and the amount of grading, excavation, and filling can be reduced.

For the smaller studs, new lightweight equipment has greatly increased the portability, productivity, and range of studwelding, particularly in shipbuilding and light construction.

Resistance Method Key Is Top Quality Welds

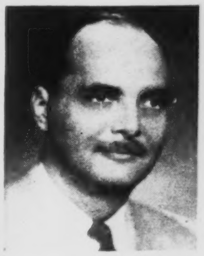
—DAVID SCIAKY

Technology of resistance welding has far outdistanced application. Only a fraction of the inherent advantages of such processes are being realized. Its production capabilities are commonly accepted, but the potentials of its structural strength are relatively untapped.

Aviation industries have long depended on the structural strength of resistance welding while others have not.

The key is properly applied resistance welding: One weld can eliminate many welds of lesser quality without affecting productivity.

For example, the integrated auto body is no challenge to a resistance welder. Such welds provide the necessary structural strength, require less equipment, less effort, and less cost than other assembly methods.



LEONARD SWANSON
President, Swanson-Erie Corp.,
Erie, Pa.

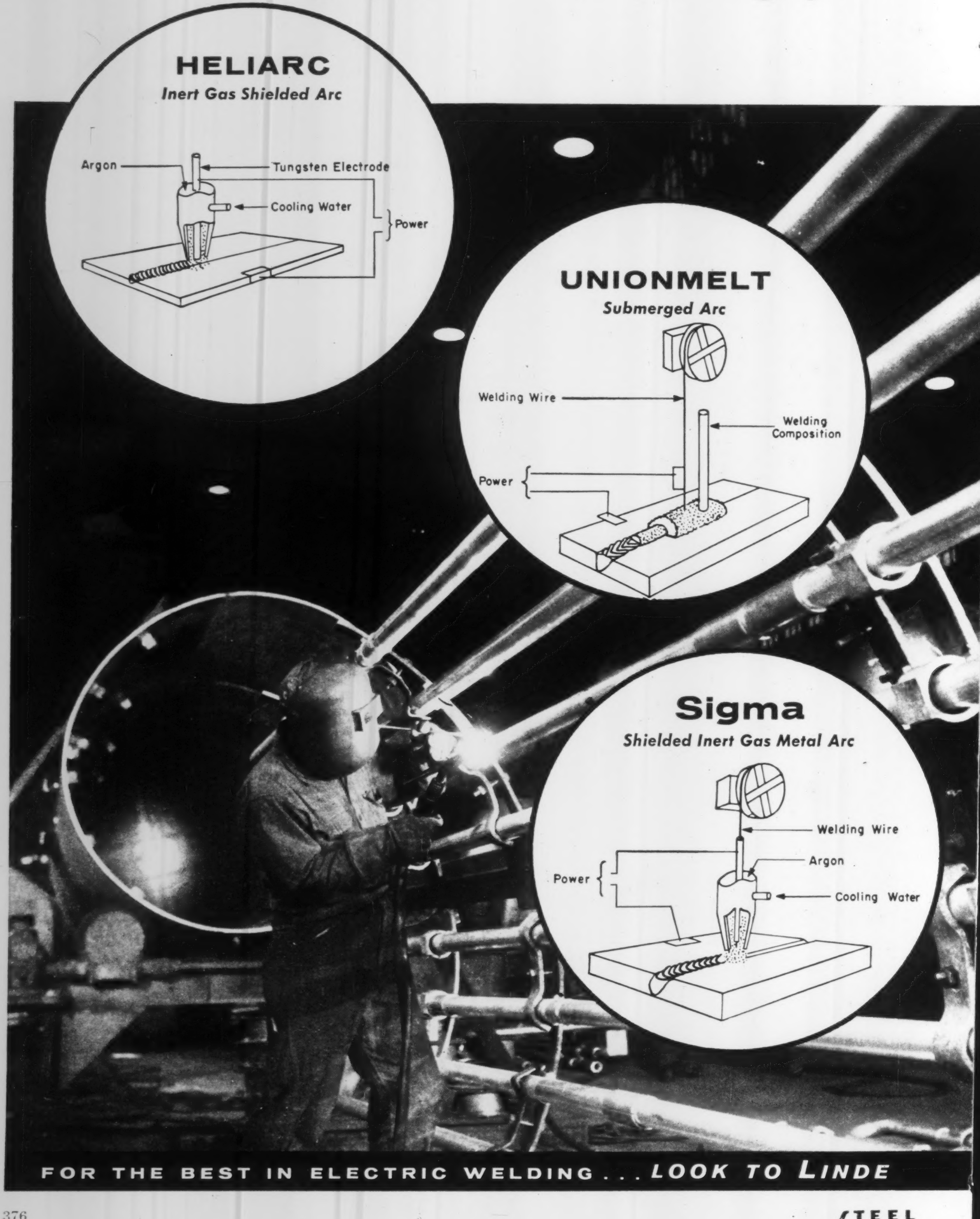
R. C. SINGLETON
Vice President-Engineering, Nelson
Stud Welding, a division of Gregory
Industries Inc., Lorain, Ohio

DAVID SCIAKY
President, Sciaky Bros. Inc.,
Chicago

If resistance welding as an industry does not tell that story, who will? Certainly, the automotive people are too busy making automobiles to find out for themselves. This is understandable, as every one is busy with the problems of making his own product.

The aviation industries over the years have greatly increased and expanded their use of resistance weld-

For any of your welding jobs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Inert gas shielded arc welding—

HELIARC Apparatus for inert gas shielded arc welding, using a tungsten electrode and a shield of LINDE argon, is tops for joining hard-to-weld commercial metals. On stainless steel and aluminum, HELIARC Welding is fast and clean, producing high-quality welds that resist corrosion. HELIARC Welding eliminates costly grinding and finishing, making it a valuable method for quantity production of hard-to-weld metals.

Submerged arc welding—

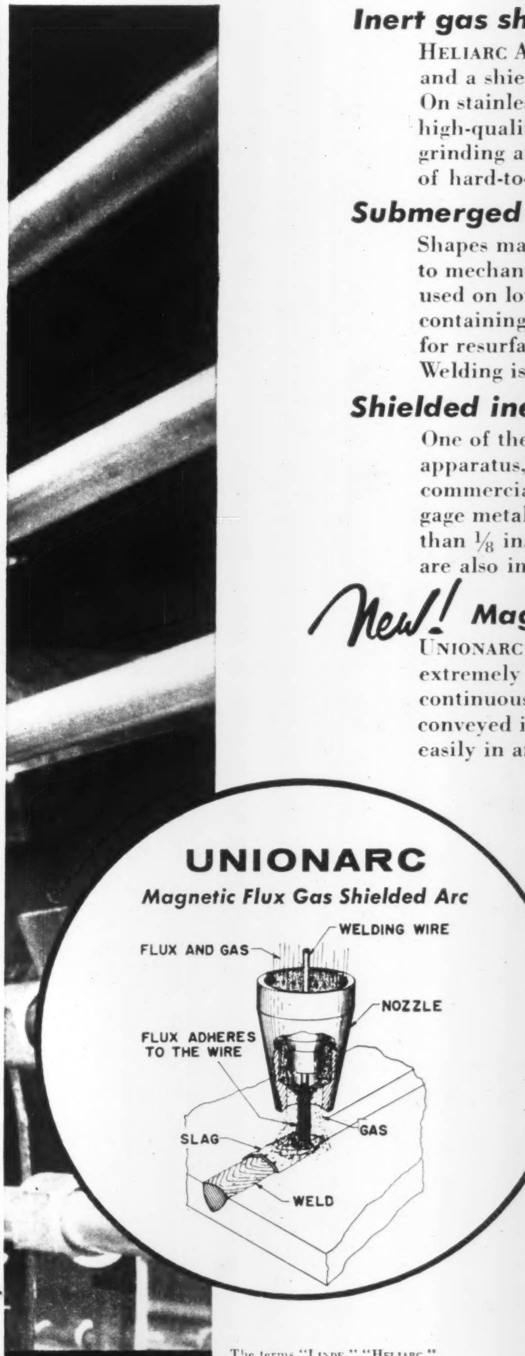
Shapes made of materials ranging from light gage to heavy plate, adaptable to mechanization, can be most economically joined by UNIONMELT Welding. It is used on low and medium carbon steels and alloy steels, including those containing chrome and/or nickel. UNIONMELT Welding is also used extensively for resurfacing metal, providing extra wear and corrosion resistance. UNIONMELT Welding is fast and inexpensive on production jobs.

Shielded inert gas metal arc welding—

One of the most versatile welding methods is Sigma Welding. LINDE's Sigma apparatus, using a shield of LINDE argon, is ideal for manual welding of commercial metals $\frac{1}{8}$ in. or more thick, and for automatic operation on lighter gage metals to .050 in. Highest quality welds can be made on aluminum thicker than $\frac{1}{8}$ in. at speeds up to 16 inches per minute. Build-up and surfacing jobs are also improved by using LINDE's Sigma welding method.

New! *Magnetic flux gas shielded arc welding—*

UNIONARC Welding, LINDE's most recent development in electric welding, is an extremely fast method for welding mild steel. This method employs a continuously-fed, bare steel wire electrode, magnetically coated with flux conveyed in a stream of carbon dioxide shielding gas. Manual welds can be made easily in any position—vertical, overhead, downhand—with no stops to change electrodes. The speed, versatility, and ease of operation of of UNIONARC Welding brings costs down 25% to 65% below those of manual covered electrode welding. Clean, smooth, high-quality welds are provided, even in the presence of moderate amounts of rust, scale, and moisture.



UNIONARC

Magnetic Flux Gas Shielded Arc

Engineers at LINDE have been designing, developing, and testing electric welding methods and apparatus for many years. Help on any welding method is yours for the asking. You can improve your work and cut production problems by taking advantage of LINDE's experience. For data on UNIONARC Welding or any other electric welding method, call the LINDE office nearest you.

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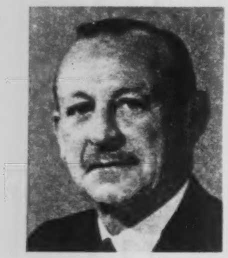

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ing. Certainly, the nonaviation industries are entitled to the same advantage.

Assemblers Rely on Screws Automatically Fed to Drives

—GEORGE A. TINNERMAN

Most of the serious barriers to achievement of higher productivity and lower unit costs are encountered in assembly.

Some manual operations are being eliminated by snap-on closures, automatic welding, and other techniques. Effective advances are being made in automatic feeding of fasteners to portable, power-driven fastening tools. Today's equipment handles most threaded fasteners up to ¼ in. in diameter without danger of jamming. Offsize or bastard screws are automatically sidetracked by mechanical selectors. The concept of perpetual feed is a practical reality.

Pneumatically operated, hopper fed screw feeders are incorporated in highly mechanized assembly lines. Drivers equipped with such feeding devices can be operated in any direction. A single driver is frequently used for several external fastening functions on an appliance.

Cold Welding Process Being Used Widely

—VERNE CLAIR JR.

Koldweld produces a solid-state metallurgical bond through pressure, die design, and surface preparation. No heat, current, filler material, or flux is needed. Joint strength varies from 60 per cent for simple lapwelds to 100 per cent of parent metal for buttwelds. It is particularly useful in joining aluminum, and aluminum to copper.

There is keen interest in the process in the electrical and electronic fields. The conductivity of such joints so made is less than that of an equivalent section of unjoined metal. The process shows great promise for joining tabs to electromagnetic coils, copper leads to aluminum rivets, and similar bimetal connections.

Since there are no fluxes or heat, the process works well with transistors, diodes, volatile and explosive products.

Recent development work in aluminum foil packaging points to new applications in sealing food, pharmaceuticals, chemicals, and atomic reactor materials.

High Temperature Service Takes Spotlight in Brazing

—A. M. SETAPEN

Under the stimulus of the defense program, much of the development work in brazing will emphasize the joining of stainless steels and heat resistant alloys for high temperature service.

Of prime importance are the evaluation and selection of filler metals for the brazing of honeycomb structures. Indications are that pure silver plus 3 per cent lithium will produce reliable high temperature joints in titanium and titanium alloys brazed in vacuum or inert gas atmospheres.

While nickel-silicon-boron alloys have superior strength and oxidation resistance at elevated temperature, they are unsuitable for most honeycomb work. Penetration of boron into the base metal produces erosion problems in thin sections. Silver-copper filler metals containing 0.2 per cent lithium appear to be the most satisfactory choice for 17-7 PH and related steels.

Soldering Moves To Automate With New Paste Materials

—GEORGE N. WILLIAMS

The most important of many advances is the trend toward automation of established soldering design. Soft soldering and silver brazing, previously rather complex, are becoming inexpensive, fast processes.

One reason for the change is automated soldering methods. Extremely accurate and inexpensive methods have been developed to apply solder alloy and flux automatically. Substantial savings are possible with any conventional heating method.

For example, a radio speaker manufacturer increased production 150 per cent, while showing labor and material savings of over 60 per cent.

Automatic processes have been made possible by paste solder materials that are stable, nonseparating, and nondrying. Unlike the old combinations of metal powder and flux, they are completely homogeneous.

High speed tin can manufacturers who must rely on soldering have redesigned some assembly operations to incorporate the new techniques.

Auto partmakers have automated their soldering. In trying to eliminate soldering, a large battery manufacturer found that the automated paste method was the best solution to its problem.

A. M. SETAPEN
Manager of Engineering, Handy & Harman, New York

GEORGE N. WILLIAMS
General Manager, Fusion Engineering Co., Cleveland

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- Cam adjustments for brake & roll feeds.
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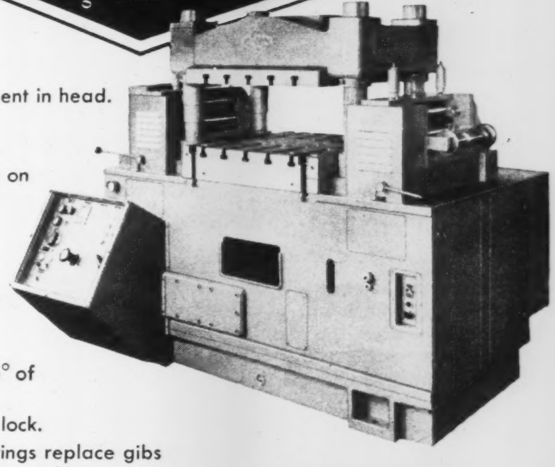

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Handling and Packaging

Material Handling Machinery Is Central in Plant Design

—R. C. SOLLENBERGER

Many plants are being built around the production system and material handling machinery; the plant becomes a single, highly complex production machine.

Products are being redesigned and simplified for economical production and for faster and less costly servicing. Many mechanized handling devices are being designed with the product user and serviceman in mind, a trend which will extend to the design of consumer goods.

Closed circuit television systems permit conveyor operators to watch many operations from a single control position; radio circuitry is used to signal conditions from remote spots or from inaccessible points, such as the interior of a storage bin; electronic counters and inspection devices in conveyor systems maintain constant, up-to-date records without human error; and atomic radiation devices may be used to keep a steady, unblinking eye on the thickness of material being moved or processed on a conveyor.

There is little room for pessimism about the future of material handling machinery. At worst, a cautious optimism would seem to be the proper approach to the coming year.

Unit Loads Gaining Favor With Venders and Purchasers

—L. WEST SHEA

Four key trends shape up for material handling equipment during 1958:

1. Economies of operation.
2. Accessibility for maintenance.
3. Improved safety.
4. Greater flexibility in equipment performance.

There is an increasing awareness by users and equipment manufacturers of the importance of planned material handling to cut distribution costs. This is evidenced by more companies working in close co-operation with their suppliers in the development of unit loads. The barrier is rapidly disappearing where the purchaser and vender each thinks the other receives sole benefits from the use of unit loads. Each is gaining a fuller appreciation that cost savings are mutual when the unit load principle is applied.

Manufacturing plants, warehouses, terminals, and distribution centers are all looking for products of the material handling industry that will save floor space. Result: Reduction or elimination of aisle areas.

Automatic Conveyors Gain, 1958 Outlook Bright

—EDWARD W. McCAUL

With 1958 shaping up as one of the most competitive years of the decade, industry will be looking for conveyor manufacturers to provide more and more in the field of automatics.

As adjuncts to simple conveyors that will mean more automatic loading and unloading. In the field of systems, it may point in one of these directions:

1. Automatic dispatching of materials between all departments.
2. Semiautomatic warehousing to provide first-in, first-out storage with improved order picking.
3. More automatic storage between operations to provide surge areas, preventing shutdowns of complete assembly lines.

ROLAND WHITEHURST
Vice President, Electric Storage Battery Co., Philadelphia

W. SHERIDAN HUSS
President, Acme Steel Products Div., Acme Steel Co., Chicago

E. W. FRANZ
Secretary, May-Fran Engineering Inc., Cleveland

ROBERT F. RICE
Manager, Crane Dept., Whiting Corp., Harvey, Ill.

4. Use of more continuous flow and automatic equipment in loading railroad cars and trailers.

5. Greater utilization of overhead space for live storage to save on expanding building costs.

Mechanized Material Handling Key to Lower Production Costs

—SHELDON K. TOWSON

Special industrial trucks will make greater contributions to reduced production costs in 1958 than ever before.

More companies have been specifying them because of their ability to do jobs economically and with great efficiency.

In 1958, business will experience its fiercest competition since the end of World War II; it will demand the slashing of production costs to a minimum.

Industry is expected to adopt a watch-and-wait attitude on plant expansion and gear its plants to do the best job possible.

Mechanized material handling equipment will prove more important than ever before, and in this connection, special industrial trucks will be used in a far greater number of applications.

Industrial Truck Batteries Have Increased Capacity

—ROLAND WHITEHURST

Technical developments in industrial truck storage batteries closely parallel and complement the developments in material handling.

The trends have been toward: 1. Higher capacity trucks which will do more work without requiring more space in which to operate. 2. Special trucks to do jobs faster and easier. 3. Less expensive equipment to do a material handling operation at no loss of efficiency.

Today's trucks are smaller than their predecessors, yet they handle more material per hour of operation and in some cases, per truckload.

Battery efficiency is rising. We are marketing a battery which delivers 45 per cent more capacity within the same cube as the one we sold four years ago. Further improvement is likely.

Integrated Handling Systems Will Be Stressed in 1958

—W. SHERIDAN HUSS

Great cost reductions can be realized by using the unit load to move products from the production line to the ultimate user.

Increasing numbers of trained people will be active in all phases of material handling. We can expect industrial management to give even more recognition to new ideas and developments in the packaging, shipping, receiving, and storing of products.

Equipment Maintenance Plan Can Spell Success or Failure

—E. W. FRANZ

We recently inspected an automaker's scrap handling system that has been in use since 1950. The conveying system (it handles scrap from large presses) has more than 1 mile of hinge belting.

The installation has operated more than 28,000 hours and has handled more than 1 million tons of scrap. Total downtime has been only 4 hours—and the larger portion of this was for the addition of a new section.

That manufacturer had a sound program of preventive maintenance. Many plants are now literally bulging with equipment that requires attention. Unless the manufacturer increases his preventive maintenance program, it is possible that his newly acquired labor saving devices can haunt him with a surge of downtime or replacement costs.

Aluminum in Bridge Cranes Reduces Weight, Ups Capacity

—R. F. RICE

Buyers are becoming conscious of crane duty classifications and are trying to obtain equipment best suited for their application.

The crane for intermittent service can be equipped with a minimum of extra features to reduce the initial cost; the crane in heavy duty service may be designed with special items like hardened gearing, oversized bearings, and high factors of safety.

Crane manufacturers are exploring methods to reduce costs, such as bridge drives without cross shafts. They have proved successful, especially on heavy cranes which have a long wheelbase, compared with their span.

The recent expansion in the aluminum industry has encouraged the use of aluminum as a material for fabricating bridge cranes. It may lead to use in installations where a saving in bridge weight would make

JOE H. PERITZ
Executive Secretary, Electric Overhead Crane Institute Inc., Washington

ELMER F. TWYMAN
Vice President, Yale & Towne Mfg. Co., New York

WALTER A. GARRETT
Sales Manager, Strapping Div., Brainard Steel Div., Sharon Steel Corp., Warren, Ohio

ROBERT H. DAVIES
Vice President, Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich.

it possible to place a heavier capacity crane on a runway; on new installations, it would save substantial amounts in the cost of the building.

Electrical manufacturers are working with the crane builders toward standardizing crane motors. They want smaller sizes for a given horsepower, standard secondary current and voltage, and standard shaft sizes and mounting dimensions.

The overhead crane lends itself to certain types of automatic operation where repetitive cycles are required, such as charging foundry cupolas. The automatic sequence of motions frees the operator for other work while the crane is transporting the load to and from its destination.

Automatic Crane Control Seen As Plant Mechanization Grows

—JOE H. PERITZ

Crane application requirements demand the handling of an increasing variety of loads at higher speeds with more positive and sensitive controls. There is continued emphasis on safety.

Reduction in the weight and size of components and more automatic crane control will be important factors. Duty-cycle crane applications have been used extensively in some material handling operations. As plants become more mechanized, we expect to see a greater number of predetermined crane operations.

We have already seen recent steps taken in component weight and size reduction in the latest NEMA motor standards, in transistors, and in miniaturization. The developments will find their way into material handling equipment.

Developments in Lift Trucks Will Stress Broader Use

—ELMER F. TWYMAN

It is no longer necessary to prove the indispensability of the industrial lift truck. Efforts are now directed to the broadening of its use.

The trucks are being produced in any impressively wide range of types, capacities, and motive powers. Gasoline, electric, and LP-gas types are generally available.

The automatic transmission and torque converter, recent technical improvements, are in general use. Advances for the immediate future are aimed at faster operation and lower maintenance costs.

Our long range design and engineering development programs envision the possibilities of new types of trucks that will be readily adaptable to the commercial jet age, to the requirements of automation, and even to the use of atomic energy.

Better Power Strapping Tools, More Uses Planned by Makers

—WALTER A. GARRETT

The years since the end of World War II have seen the greatest period of growth in the development of special and powered tools for the application of strapping. The somewhat "trimmed down" economy that we appear to be experiencing means we must develop more and even better ways to do the job for users of steel strapping.

Tremendous strides in packaging and material handling have been made in many industries, but in 1958 the brick and clay industry will begin to really take advantage of the dollar savings available through the use of steel strapping.

The lumber industry is somewhat further ahead, but here again mechanization will permit, on a much larger scale, the full economy that can be gained from using steel strapping.

Even in the steel industry, where much work has been done, there is still a tremendous opportunity for strapping companies to further develop equipment to solve special problems.

Better knowledge of customer needs will bring forth various new portable power tools. They will be light enough to be taken to the job and handled by the workman, but powerful enough to insure uniform tension, faster application of strapping, and less fatigue for the operator.

Unit Load Handling To Gain, Outside Storage Trend Is Up

—ROBERT H. DAVIES

Three related trends in the application of material handling equipment will influence design and development in 1958: 1. Bigger unit loads. 2. Growing emphasis on flexibility as a major requirement in handling systems. 3. Increasing use of unimproved land for storage.

The move to bigger unit loads is basically an effort to maintain production without raising handling costs. This already can be seen in the use of 50,000-lb capacity straddle carriers for steel handling. As big-unit handling becomes more prevalent, there will be a swing toward high-capacity fork trucks. Units of 40,000-lb capacity have been developed; they may soon replace the

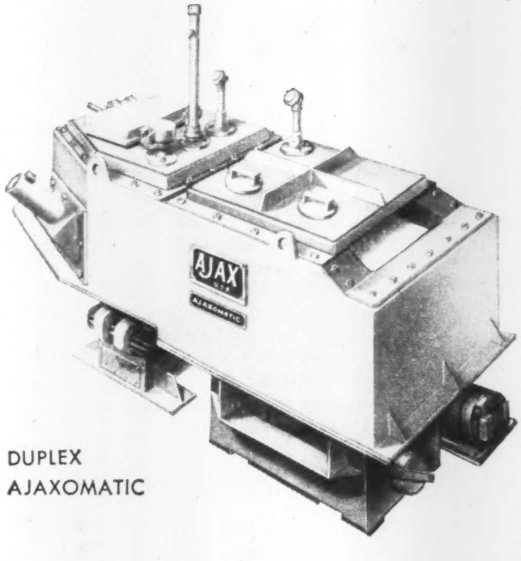
CAN WE STILL AFFORD HAND-LADLING?

AJAXOMATICS

bring automation to die casting

The Duplex AJAXOMATIC melts aluminum pig and gates right at the die casting machine. By pushing a button the operator initiates the complete casting cycle: the die closes and the Duplex AJAXOMATIC pours the exact required amount of molten metal directly into the cold chamber. The operator just removes the finished casting at the end of the cycle.

Automation, however, is only part of the AJAXOMATIC story. The Duplex AJAXOMATIC also gives assurance of consistent quality. The quality of a finished casting begins with the proper melting of the metal. 60 cycle induction with its two basic features of internal heating and electromagnetic stirring is used exclusively in the Duplex AJAXOMATIC. Here are the unique characteristics of the Duplex AJAXOMATIC:



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AJAXOMATIC

- Precision temperature control — at low temperature
- Alloy uniformity — no segregation
- No gas porosity
- Low metal loss
- No supply ladle system or hand ladles
- Precise weight of automatic pour
- Comfortable working conditions
- Low maintenance

The standard Duplex AJAXOMATIC is rated 120 kw to produce 500 lbs per hour of castings ranging from ½ lb to 30 lbs. Other AJAXOMATICS are available to suit a wide range of production requirements, including units supplied from central melting systems. May we have an opportunity to study your requirements?

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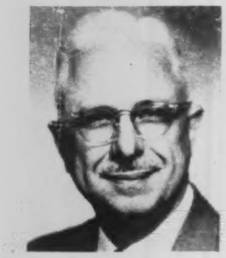
ENGINEERING CORPORATION

TRENTON 7, NEW JERSEY

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company



EUGENE CALDWELL
President, Baker-Raulang Co.,
Cleveland

LESTER M. SEARS
Chairman of the Board, Towmotor
Corp., Cleveland

HOWARD M. PALMER
Vice President & General Sales Mgr.,
Lewis-Shepard Products Inc.,
Watertown, Mass.

A. F. ANJESKEY
Sales Manager, Cleveland Crane &
Engineering Co., Wickliffe, Ohio

10,000-lb trucks once thought to be the ultimate.

In the cost-sensitive metalworking field, the twin characteristics of flexibility and versatility will be stressed as new handling techniques are worked out, reversing the drift toward specialized equipment. Where once the machine designed for a single function was popular, new installations will favor all-purpose equipment. Manufacturers will have to provide a larger selection of special devices and attachments to broaden the function of lift equipment.

A new type of fork truck—the heavy duty, rough terrain machine—will hasten the adoption of outdoor storage techniques, successful in a number of steel mills and foundries.

Attachments Convert Trucks Into Special Package Handlers

—EUGENE CALDWELL

Cost reduction studies enable the packaging engineer to save his firm thousands of dollars by designing and using a new package for the product that is more economical and just as serviceable.

Manufacturers of lift trucks must keep up with modern packaging methods. Lift trucks are becoming more versatile through the use of attachments designed to handle packages of specific shape and makeup. Appliance grabs, finger lifts, carton lips, load grabs, suction devices, and other ingenious modifications will convert the so-called fork truck into a "handler" that may well spell the end of the fork lift truck as such.

Additional application trends in industrial trucks will result from the changing complexion of military needs. Handling of loads such as the missile and its components has become specialized because of their shape and other characteristics. They have already been tackled successfully in interplant movement, and ground handling problems are being explored. As new and more complex weapons are developed, the challenge to the material handling industry will be greater.

Lift Trucks Play Vital Role In Automatic Handling

—LESTER M. SEARS

Material handling accounts for about 25 per cent of the cost of manufacturing. The disturbingly high figure is due to a relatively widespread use of costly manual methods.

Greatest strides can be made by investing in modern fork lift trucks and other mechanized handling equipment. New advances in lift truck engineering are founded to a great extent on integrating handling operations more effectively with automation.

A significant trend toward further mechanization is the increasing use of truck attachments which clamp, push, pull, ram, shift, and rotate loads. A greater number of trucks equipped with automatic transmission and power steering are being purchased.

Prepalletized Loads Increase; Make for Easier Handling

—HOWARD M. PALMER

Users of industrial trucks want more flexibility. They are showing increasing preference for trucks that will handle all types of loads—palletized, nonpalletized, and those on skids.

In many cases, attachments have provided this flexibility, converting a single purpose truck into a multiple purpose unit. Only trucks capable of performing a wide variety of handling operations can be utilized full time in many plants. Flexibility becomes essential when a company makes a capital investment in a full time truck. Development and production of special trucks to handle volume operations will still continue to supply the demand from large plants and those in specialized fields.

Another trend expected to increase in 1958 is the shipment of prepalletized loads of finished products. Manufacturers have found that prepalletized shipments are easier for distributors and customers to handle. Prepalletizing makes a more saleable product and has proven successful in most cases where it has been used.

Coiled Rod Producers Need Better Packaging

—A. F. ANJESKEY

Proper packaging can give a real boost to material handling.

Banding rolls of paper weighing as much as 6000 lb permits storing them to a height of 40 ft. Building products, such as concrete blocks, bricks, and other ceramic materials, are banded to pallets with steel strapping, permitting transportation and higher storage by a fork lift truck or overhead equipment.

Even the sheet mills are shipping flat sheets in packaged form. But mills rolling steel rods have not kept pace with the trend toward better packaging, although the product is

(*Please turn to Page* 388)

These Jobs are done more efficiently

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1. **For Controlling Gas Mains . . .** Bailey Goggle Valves in thermal expansion (36" to 120" diameters) and mechanical (6" to 72" diameters) types.
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3. **For Blast Furnace Stoves . . .** Bailey services include design, construction and relining — using Kennedy Checkers with cross-flue feature.
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Other Bailey Products: Blast Furnace Cold Blast Valve • Blast Furnace Blow-Off Valve • Check and Snort Valve • Mixing and Check Relief Valve • Fabricated Steel Stove Bottom • Precision Table Feeder • Ladle Skulling Hook

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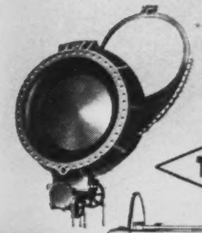
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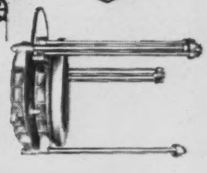

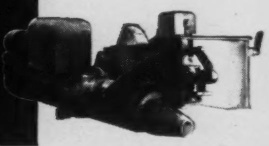
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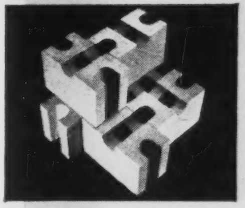
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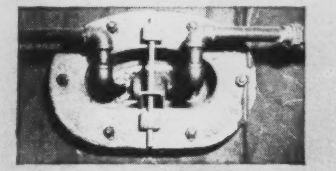
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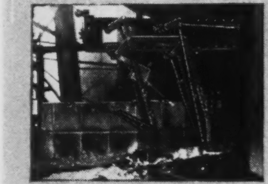
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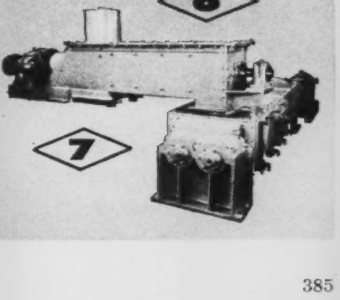
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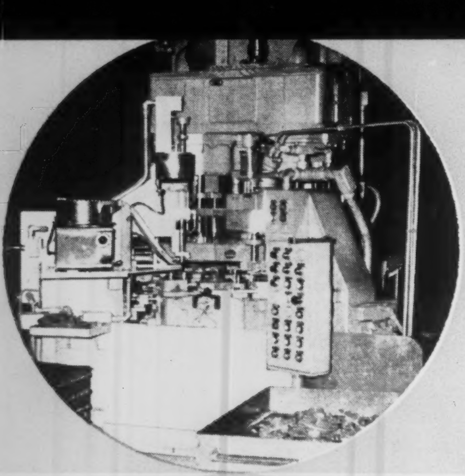
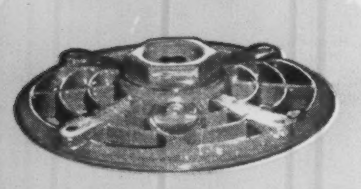


At Wagner Electric Corporation

One Natco



Two sizes of motor end-plates are assembled, bored, drilled and tapped in a Natco 3-Way Machine.

NATCO

Assembles, Bores, Drills and Taps...
Reduces Labor Cost 70%
On Small Motor End-Plates

This Natco combination assembly and multi-drilling machine presses a bearing sleeve into the end-plate, rough and finish bores the outside bearing-cap hole, drills an oiler hole at an angle, drills four (4) thru-bolt holes, and drills and taps two (2) 8x32 cover plate holes. *Production is 170 pieces per hour.*

This Natco accommodates two sizes of motor end-plates without changes in the basic rotary-table tooling. In addition to this important versatility the engineers at Wagner Electric point out these other advantages:

- *one operator* controls the assembly and machining from one station.
- *work scheduling* is simplified due to the short machine cycle.
- *in-process inventory* can be kept at a minimum because of high production rate.
- *floor space* is made available for other operations.

Natcos perform all kinds of drilling, boring, facing and tapping jobs in every conceivable combination and sequence.

Ask the Natco Field Engineer about the newly perfected tape control systems for Natco production tools.

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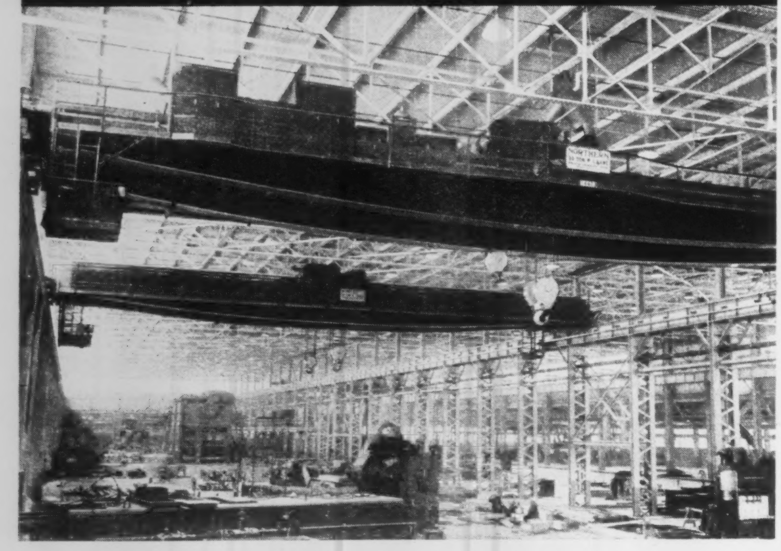

these notable twins assure dependability

LOCATION Press bay of a large, new plant manufacturing rear axle parts and components for automobiles and trucks.

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ADVANTAGES These twin NORTHERN cranes serve twin heavy press lines located at each end of the press bay. Designed for heavy duty requirements with compensating type bridge end trucks, and equally suitable electrical equipment and controls, they dependably and safely speed machinery installation or relocation, and assure smooth, uninterrupted flow of work in today's and tomorrow's automated production.

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O. H. McCLEARY
President, Mathews Conveyer Co.,
Ellwood City, Pa.

rolled in coils of 600, 900, and 1200 lb. Processing loosely tied coils usually results in snarls and turn entanglements.

A system of storing coiled rods vertically has been installed in two plants. Savings are appreciable. Twice as many rods can be stored vertically in an area. The method permits separating the different categories of steel, eliminating rehandling.

Proper packaging of rods presents a challenge to the rod mills as well as to the manufacturers of strapping materials. With the co-operation of the strapping manufacturers and accelerated research, mills could solve the problem and improve their own operation—and facilitate delivery and handling in customers' plants.

Conveyor Systems Essential To Continuous Flow

—O. H. McCLEARY

Large metalworking plants are putting strong emphasis on continuous flow of materials in process. More conveyors with automatic features are being used.

Manufacturers of engineered conveying systems will be called on to design equipment that will handle a broad variety of products, in-process and finished, faster and in greater volume than ever before.

In the smaller plants, where there must necessarily be less emphasis on automation and automatic control, mechanized handling is getting special attention.

Many types of conveying equipment (gravity and power, floor and overhead) and the engineering which gets them properly applied, are helping to bring about a continuous flow of materials in these plants.

Another **STANLEY STEEL STRAPPLICATION*** on the job

Power easily makes 3 times 16 equal ONE

3 tiers of cylinder head forgings, 16 forgings to a tier, make a sum total of 48. But secured to a pallet by the Stanley "Uni-Tie" Method, all 48 become ONE compact package, easier for this Cleveland manufacturer to handle, store and ship. Using the Stanley Electric Skid Magazine Power Tool, every strap is effortlessly and speedily *power*-tightened to the same pre-determined tension, so there's no danger of the strapping loosening or the load shifting.

Perhaps teaming up the Stanley "Uni-Tie" Method with *power packaging* is the way for *you* to save time, space, man-power or eliminate costly containers. **WRITE FOR FREE COPIES** of the new "Power Strapplications" booklet and the "Stanley Strapplication Manual of Packaging and Shipping" to **STANLEY STEEL STRAPPING**, Division of The Stanley Works, Dept. A, 1301 Corbin Avenue, New Britain, Conn.

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FROM STOCK FOR
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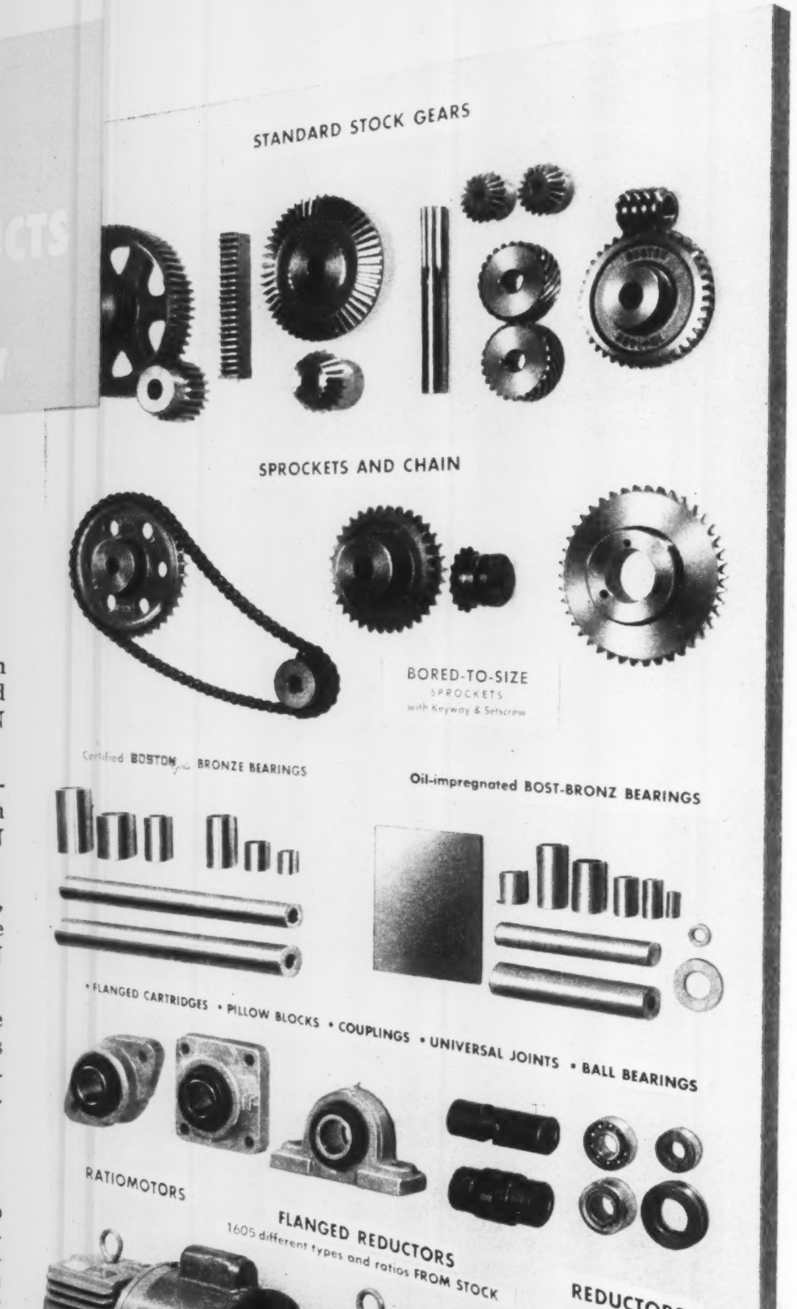
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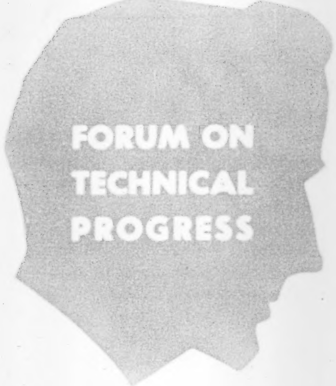

Lubrication

Research Will Concentrate On Lubricant Cost, Quality

—W. W. SCHEUMANN

Money spent by laboratories this year will probably be for product improvement. The lowering of product cost will also receive considerable attention. Both aims are spurred by competition in the industrial lubricants market and conditions in the general economy.

New products which might appear this year undoubtedly will be mainly for heavy industry. Equipment changes and better operating procedures, leading ultimately to reduced expenses, will provide the impetus for the development and use of these new products.

High Production Machines Pinpoint Lubricant Needs

—B. M. DUNHAM

Over-all functional properties of oils and greases continue to be amended to insure trouble-free operation of costly integrated machinery. The trend will be toward qualified service life, metal protection, constant cleansing action with improved film strength and friction reducing properties.

New offerings in fire resistant hydraulic and circulating system fluids will be made at generally lower cost. The fluids will be of particular interest to the steel, mining, and automotive industries.

Improvement of metalworking oils for machining of high heat resisting alloys for the aircraft industry will continue. Progress will be made in roll oils for aluminum, stainless steel, titanium alloys, and brass, as well as more efficient oils for thread and form grinding.

Two Barriers Block Progress In Industrial Lubrication

—H. A. HARTUNG

We may expect the appearance of more multipurpose lubricants. General purpose oils and greases, hydraulic and turbine oils, and metalworking lubricants should maintain the rate of development maintained the last few years.

Unfortunately, in certain areas, improvement has come slowly or not at all. Although generalizations are difficult and sometimes dangerous, two factors seem to stand out.

The first is the use of restrictive or nonrealistic specifications by users of industrial lubricants. If a specification defines the composition of a product, a barrier to research is set up.

The second element is the absence of adequate and definitive testing procedures. This is the business of lubricant manufacturers and users alike. Recently, there has been a trend toward the freer publication of test methods and screening procedures; if it continues, we can hope for greater advances in all areas of the industrial lubricant field.

Solution-Type Coolants Boost Tool Life

—G. W. GLEIM

In the field of metalworking lubricants, materials designated as "solution type" are receiving added attention. Soluble oils (actually oil in water emulsions) have been used for a long time. The solution-type materials make true water solutions

JOHN R. McCOY
Manager, Technical Service,
Indiana Commercial Filters Corp.,
Lebanon, Ind.

K. L. BERKEY
Wright Air Development Center,
Wright-Patterson Air Force Base,
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E. P. KINGSBURY
Dept. of Mechanical Engineering,
Massachusetts Institute of Technology,
Cambridge, Mass.

JOHN A. BOYD
Vice President, Van Straaten
Chemical Co., Chicago

rather than emulsions.

These materials function mainly in their cooling capacity, extending tool life by maintaining cutting temperatures as low as possible. They do not fill the entire bill covered by soluble oils or heavy duty soluble oils which have some lubricating or chemically active characteristics that would assist in heavy cutting operations.

The solution-type materials are clean to work with; they offer good rust protection; and some are free from bacterial decomposition.

In general, these solution-type materials will be useful in a large number of machining operations, especially the light duty jobs.

Clean Coolant Is a Must For Precision Machining

—JOHN R. McCOY

Precision machining operations are required to produce many of the quality products in use today. Good coolants are necessary to carry away heat and chips and to lubricate the parts. Regardless of the quality of the lubricant, it cannot perform its functions properly unless it is kept clean.

The use of clean coolants in modern, high production methods will result in better finish, closer tolerances, less rejects, higher production, less wheel dressing and tool sharpening, and longer coolant life.

Aircraft Engine Lubricants Face Load, Heat Problems

—K. L. BERKEY

Aircraft of the future will incorporate higher thrust engines and operate at higher speeds. Both will result in higher oil temperatures and higher gear temperatures. Higher gear tooth unit loads will be applied, necessitating increased load carrying capabilities of the oil. Oils must be able to prevent scuffing under the high temperatures and loads and must not have an adverse effect on the fatigue life of the gear tooth surfaces.

Oils must have ability to withstand high loads over extended periods. Gear load carrying additives must be carefully selected so they will not effect undesirable deposit formation and oil breakdown.

Solid Film Lubricants Still Being Improved

—E. P. KINGSBURY

Solid film lubricants offer effective protection of sliding parts when conventional lubrication is undesirable or impossible. The lubricants cannot be squeezed out by high loads and low sliding speed, are capable of lubricating any hard surface, and have no tendency to accumulate dust and dirt. They do not need to be sealed in or out of critical regions and can conduct electricity. They work at low temperatures and can withstand extremely high temperatures under loads for relatively long times. However, solid film lubricants are somewhat more difficult to apply than are ordinary oils and greases.

Typical applications include small fasteners shot into concrete, parts exposed to temperature extremes in aircraft and missiles, and optical or photographic systems where fumes and grease are objectionable.

The films are composed of a mixture of two different agents (the pigment, or lubricating material, and the binder, generally a thermosetting plastic which holds the pigment between two rubbing surfaces. Current work is aimed at improving both constituents. Pigments such as lead oxide, lead iodide, and silver sulfide are undergoing investigation, while work with the two present-day standbys, graphite and molybdenum disulfide, continues.

The limiting factor in high temperature application appears to be the ability of the binding material to withstand oxidation. The best high temperature binders today are made of a silicone resin; work with some ceramic materials has been started. Successful lubrication already has been achieved at temperatures up to 1000° F; prospects for even higher temperatures appear good.

New Cutting Compound Will Aid Work with Cast Iron

—JOHN A. BOYD

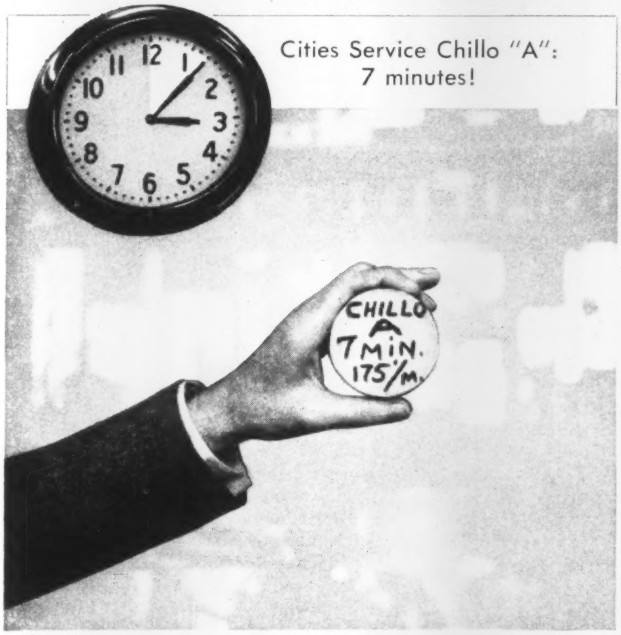
A new class of water soluble compound with excellent cleaning and wetting characteristics will appear in 1958. One important use will be in cutting and grinding operations on cast iron. Another will be in grinding operations where a free cutting wheel is necessary.

The cutting and grinding compound will receive greater attention as a cost cutting tool in 1958. Lubricants must be able to do more than help cut metal—they must cut costs.

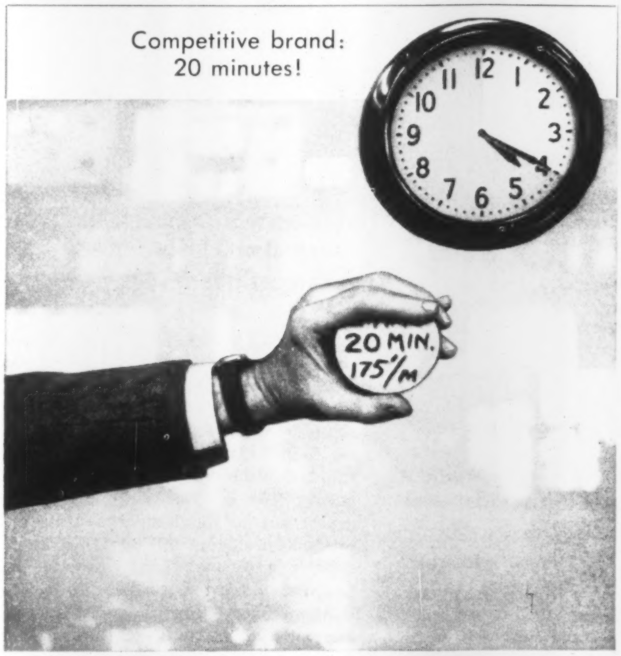
Studies that show the tool lubricant's effect on over-all costs will be used to improve metalworking effi-

Cutting Oil takes the time test

at S. G. Frantz Co., Inc., Trenton, N. J.



Cities Service Chillo "A":
7 minutes!



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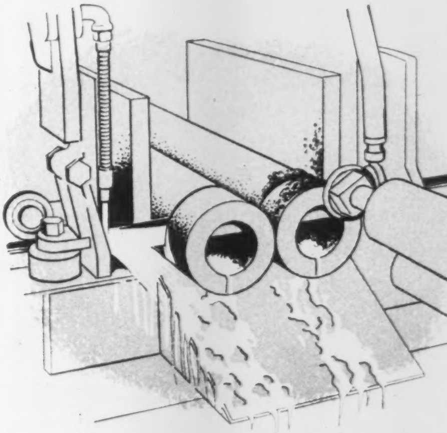

S. G. Frantz Company decided to keep a truly open mind.

They'd been using Cities Service Chillo Cutting Oil and other Cities Service products for some time with great satisfaction. Still, there was no harm testing Chillo Cutting Oil against another brand just to make sure they were getting maximum results.

But even the people at S. G. Frantz never expected what followed. Using the competitive oil, and a piece of 4130 aircraft rod, 2⅞" in diameter, they made a single cut at saw speed of 175 feet per minute. Time: 20 minutes.

Next, the same test again – but this time with Cities Service Chillo "A" Cutting Oil. Time: 7 minutes! Nearly three times faster!

Using the same material on another job, the Frantz Company found difficulty making clean threads to aircraft standards on a Number 5 Turret Lathe—that is, until Cities Service Chillo 10Z was tried. Right there the problem ended.

"The problem ended." You'll hear it again and again from those who use Cities Service Cutting Oils and lubricants. And perhaps these oils can end a problem for you, too. Talk with a Cities Service Representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

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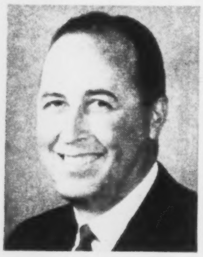


L. O. WITZENBURG
Vice President in Charge of Sales,
Farval Corp., Cleveland

ALEX P. FOX
Vice President, Lincoln Engineering
Co., St. Louis

ciency. They measure the ability of the lubricant to increase machining speed, improve finish, reduce maintenance cost, and keep production on a even keel.

Marked progress will be made with new water soluble compounds. Guaranteed against spoilage, they will reduce costs by decreasing the maintenance problems created by rancid emulsions. In addition to greater stability, they will help in prolonging tool life.

The use of abrasive belts in polishing and grinding operations will be given a boost by the development of belt lubricants that will improve finish and increase belt life.

New Lubricants Tailored To a Variety of Needs

—R. Q. SHARPE

Designers and users of industrial machinery may look forward to circulating and hydraulic oils that are more resistant to high temperatures, catalytic metals, and contaminants. Also, they may look forward to products that have a wider range of application and that will provide more dependable service with less equipment maintenance. Better fire-resistant hydraulic fluids will be available during the year ahead.

Lubricants for such special applications as ways, air devices, heavily and shock loaded gears will utilize more effective additives for protection against wear, galling, rusting, and oxidation. An increased use of solid lubricants may be expected.

Greases utilizing new soap complexes, will provide better resistance to mechanical separation, washout, high temperatures, heavy and shock loads, and chemical stability.

More Data on Metal Cutting Aid Cutting Fluid Experts

—A. DORINSON

Better insight into the action of metal-cutting fluids and impressive progress in the understanding of metal-cutting fundamentals will undoubtedly be applied practically to benefit the metalworking industry.

With such knowledge, the cutting fluid specialist will be better able to analyze the demands of a multiple operation machine tool in terms of the most critical component of the tooling and recommend the cutting fluid with the most beneficial over-all performance. Having data on responses of different types of ferrous and nonferrous metals to cutting fluids, he will be in a better position to know when special measures must be taken.

Good Housekeeping Needs Boost Automatic Lubrication

—L. O. WITZENBURG

The trend toward automation and less dependence upon the human element continues. Automatically controlled lubrication is an important part of the trend.

Today's machine is not modern unless it is complete with its own automatic centralized lubrication system. Many machines have several systems, each complete with its own lubricant reservoir, high pressure pump, timer, and metering valves which force the lubricant into individual bearings.

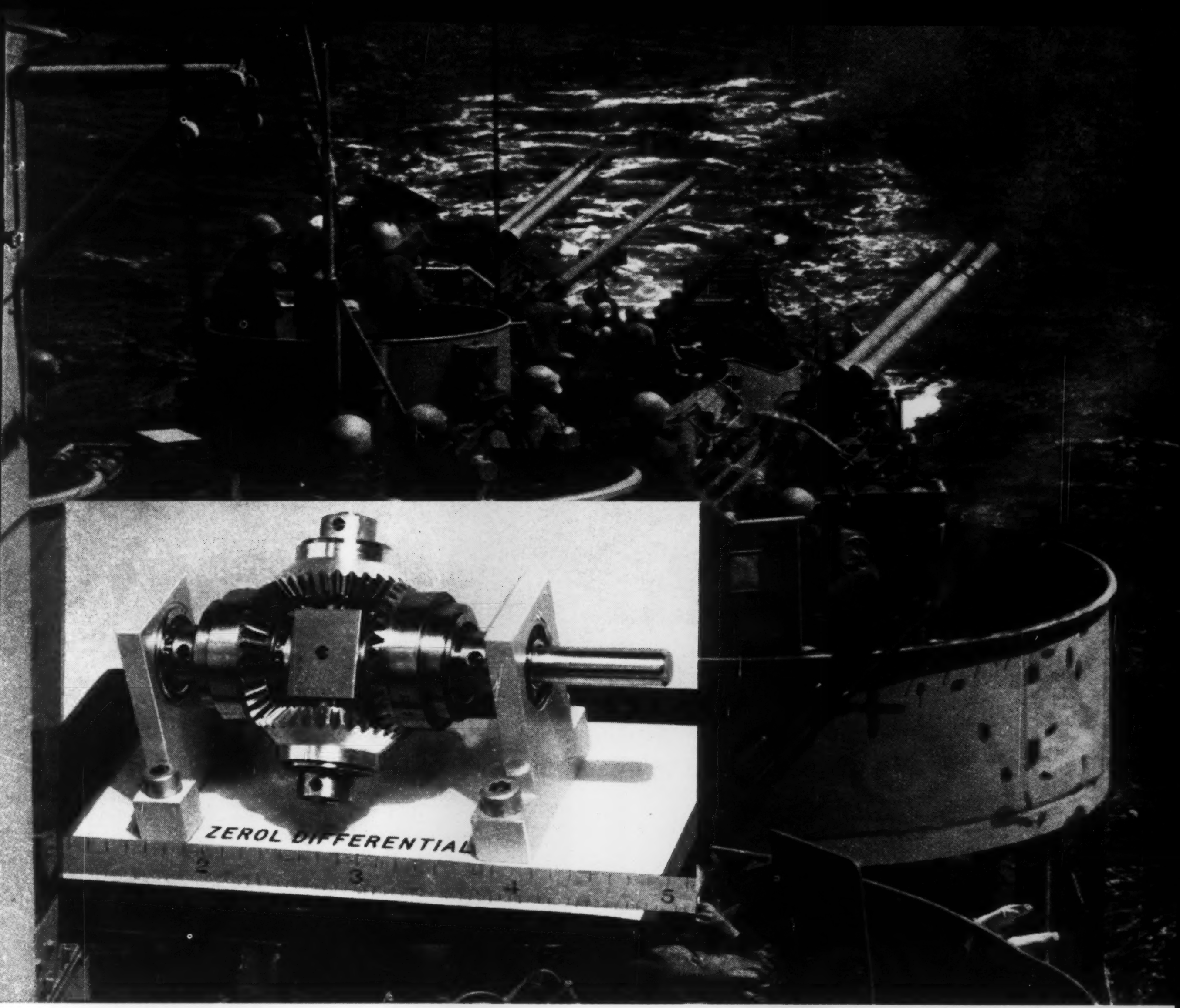
Good housekeeping has done much to influence the design and use of centralized lubrication systems. More and more industries are becoming concerned with safety hazards resulting from overlubrication—excess grease piling up on the machine or oil flooding the floor. The result has been a demand for systems that provide close adjustment of the amount of lubricant delivered to bearings, or for a completely enclosed circulating oil system that will force oil to the bearings under high pressure and give warning when any bearing is in trouble.

Automatic Lubrication Is Competitive Wedge

—ALEX P. FOX

A substantial part of the over-all cost of plant or mill maintenance can be directly attributed to faulty lubrication. This cost, which is still rising, is about equal to the dividends stockholders receive—or an estimated $9 billion to $10 billion annually. The estimates do not include losses due to machine downtime and production losses brought about by repairs resulting from obsolete and haphazard lubrication practices.

Automated lubrication offers a competitive advantage that cannot be ignored. There are several reasons, including: The techniques of automation are expanding throughout industry; there is increasing emphasis on quality control; and machines are being precision built to operate at greatly increased speeds and carry heavier loads.



Official United States Navy Photograph

When your fine pitch gears *must be accurate*

When you work with fine pitch gears like those in this naval fire control unit differential, tolerances are critical.

Tooth-to-tooth accuracy is extremely important to permit the guns to be sighted precisely on target.

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2. Machines that test gears thoroughly

The Gleason No. 104 Hypoid Tester, for example, checks running qualities, tooth spacing, and concentricity of gears. It records test results on paper so that you have a permanent record of the total tooth-to-tooth composite error.

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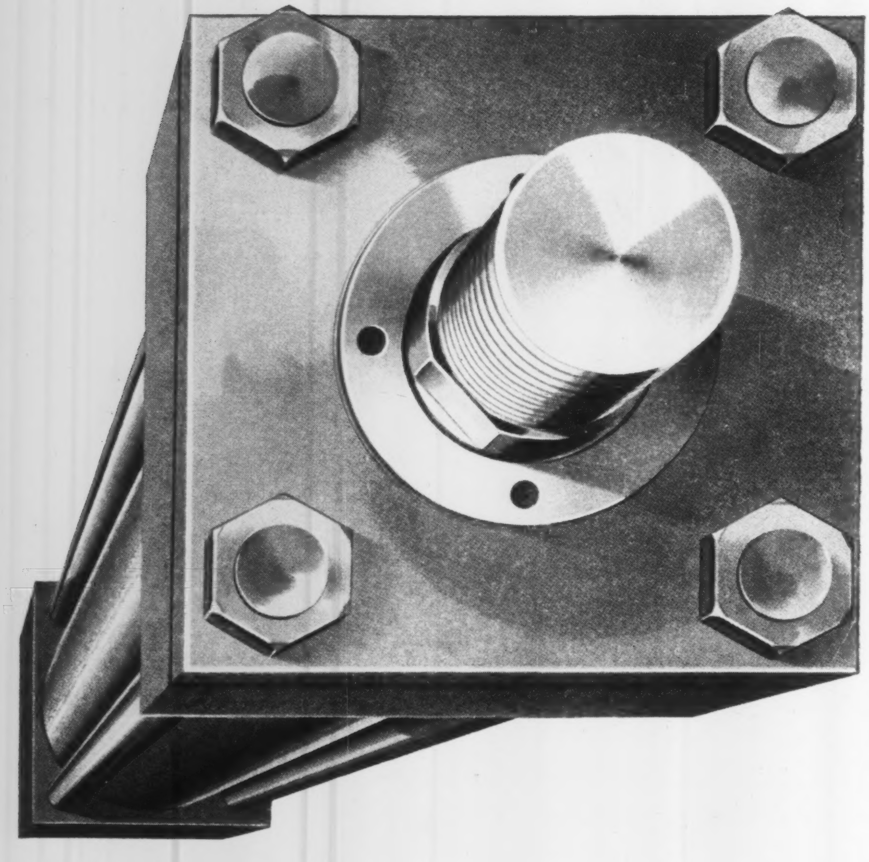

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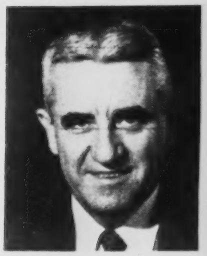
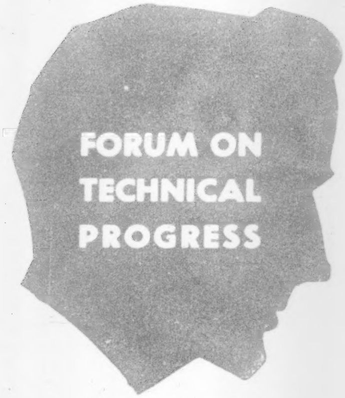


DON E. BLOODGOOD
Professor of Sanitary Engineering, Purdue University, Lafayette, Ind.



Service and Maintenance

Dust Fume Control Progress Made in Newer Processes

—E. A. CARSEY

The study and application of effective dust and fume control measures to changing operations and processes in metalworking is a continuing challenge to the ability and ingenuity of the engineer and the manufacturer of control equipment.

Progress continues in the application of such equipment to the newer processes, such as leaded steel. It brings higher productivity in the plant.

New developments in centrifugal, wet, filtration, and electrostatic collecting units are making efficient, longer lived, and more compact equipment available to handle various problems in metalworking.

Rotary Type Air Compressors Gaining in Industrial Uses

—CHARLES E. FLORA

The portable air compressor has undergone a complete face lifting with the introduction of the rotary compressor. The piston type, or reciprocating unit, has all but become obsolete within a few years.

The stationary, industrial air compressor will have to follow its portable counterpart and go modern. It is our feeling that it is just a matter of time until all industrial air compressors will be rotary.

Plants using 125-psi service air for tools, hoists, and other pneumatic machinery can get rotary units in ratings from 20 to 100 hp. Compressors rated up to 125 hp will soon be on the market.

In higher pressure units, such as 200 psi, horsepowers are still low, but watch for developments along this line.

High-Impact Battery Covers And Containers Gain Ground

—HENRY E. JENSEN

The industrial storage battery is undergoing marked changes and improvements. We see greater capacity for minimum volume and better overall reliability.

Many sizes and types of batteries used to power electrically driven equipment will have high-impact containers and covers. The new containers also will be used for applications where batteries are subject to severe shock and vibration.

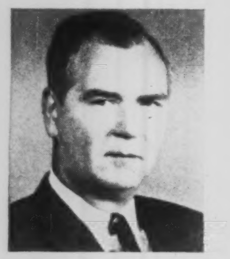
Glass containers, used for many years in stationary-type batteries, will be replaced almost completely by lightweight, shock resistant, transparent plastics. The plastic containers will result in smaller dimensions for a given capacity, practically eliminating battery breakage during shipment and installation.

Use of lead-calcium alloy in the basic framework or plate grids of many types of long-life stationary batteries and special diesel-starting batteries will continue to gain more widespread use. As a result of the marked improvement in the additional life obtained from this type of grid alloy, over-all costs of these types of batteries will be reduced.

Greater Re-use of Water Creates Disposal Problems

—DON E. BLOODGOOD

Large quantities of water are used in processing metals. In the future, there will be a need for greater quantities, or what seems more likely,



WALTER L. DAVIDSON
Manager, General Sales Dept., Machinery Div., Dravo Corp., Pittsburgh

W. O. VEDDER
Vice President, Pangborn Corp., Hagerstown, Md.

JAMES W. WILCOCK
General Sales Manager, Sturtevant Div., Westinghouse Electric Corp., Boston

N. T. SHIDELER
President, Insul-Matic Inc., Pittsburgh

there will be a marked increase in the practice of the re-use of water.

This means that engineers responsible for waste treatment must continually search for new and better water recovery methods. These are some of the areas where work must be done:

1. Processes for handling waste pickling liquids that will save the iron now lost, reduce costs, or be more effective.
2. Compounds to destroy cyanides used in heat treating and metal plating that are less toxic.
3. A lubricating material more easily purified and recovered. When water is used, solids in the form of scale plague the persons responsible for disposal of unwanted materials.
4. Emulsions of oil in water. A greater knowledge of the physical chemistry involved in emulsion formation and disintegration is needed.

Space Heaters More Efficient, Safer, Controlled Automatically

—WALTER L. DAVIDSON

Design changes in direct-fired space heaters have led to more efficient combustion and air-handling functions, improved safety features, and automatic controls.

The industry is able to custom-engineer forced draft space heaters to meet specific operating conditions in the customer's plant. They may range from comfort heating and ventilating to air tempering and process drying, with all features incorporated in self-contained units with outputs up to 2,000,000 Btu an hour. Heaters have been perfected to burn gas or light oil interchangeably, or No. 5 oil.

Many large plants, with central systems that are expensive to operate, are looking with favor on space heating units. Example: An east coast company has placed an order for 83 heaters to replace a steam system. This is one of the largest peacetime orders ever placed with a space heater manufacturer.

Dust Control Systems Operate At Higher Loads, Temperature

—W. O. VEDDER

Dust and fume control systems are vital components of modern plants. They improve plant working conditions, eliminate public nuisances, and let you reclaim usable materials.

Developments in industrial dust and fume control equipment have been principally in improvements, refinement, and modernization of equipment to increase over-all effectiveness and reduce operating and maintenance costs.

Equipment has been modified or combined to meet requirements of higher loadings, finer particles, and higher temperatures.

Full scale control equipment installation and operation in a number of new applications are in process as a result of experience gained through small scale pilot operation.

Industrial Air Conditioning Provides Comfort and Benefits

—JAMES W. WILCOCK

The continued high rate of expansion, both in new buildings and in revamping, is emphasizing the need for better types of ventilating equipment.

For general ventilating requirements, centrifugal fans with blades of airfoil design are available in all sizes, arrangements, and classes.

That design offers high peak and operating efficiencies and a low noise level.

The trend toward air conditioning plants promises to increase drastically in the next year or so. Air distribution equipment, such as central station air conditioning units, is available in various pressure classes, arrangements, dimensions, and capacities for all plant needs. Electronic air cleaning can be obtained as an integral part of the air distributing unit as well as a separate unit.

More thorough cleaning of ventilation air in industrial operations will be possible with the advent of industrial air conditioning. (To properly cool a building it must be sealed.) Electronic air cleaning can remove up to 95 per cent of contaminants from the air. (This includes particles as small as 1/250,000 in.)

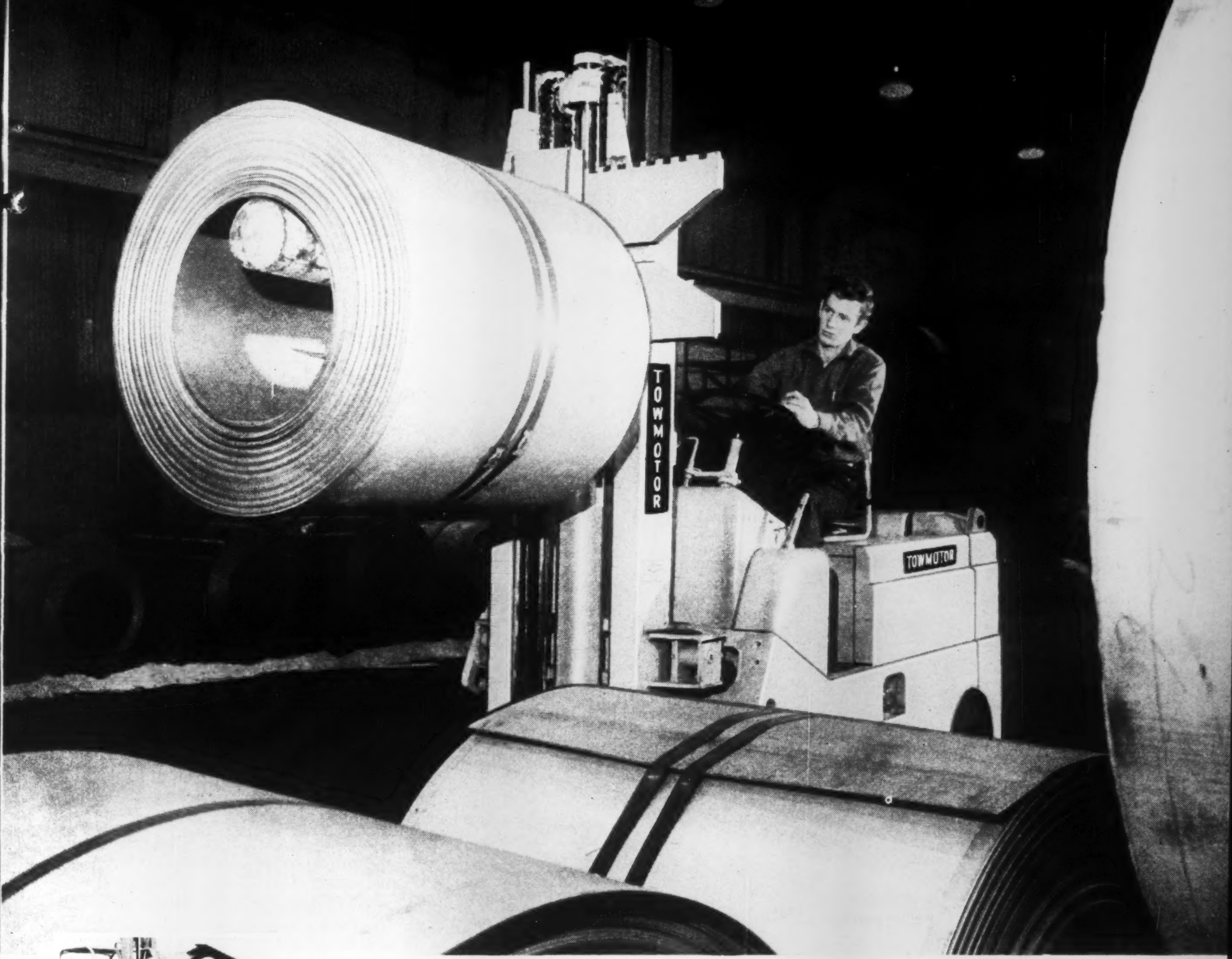
The plant of tomorrow may have an atmosphere of "perpetual springtime" with temperature, humidity, and dirt all closely controlled and regulated to provide the maximum comfort and benefits.

Trend in Pipeline Coatings Is to Film Tapes, Epoxies

—N. T. SHIDELER

There is a noted trend toward the use of cold applied coatings for protecting underground pipelines. What is needed is a coating that can be applied easily, without heat, and still have equal or better corrosion resistance and the long life of the hot applied coatings.

One effort in this direction is thin film tapes which can be rapidly,



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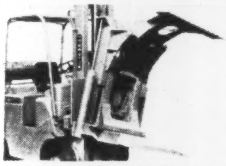

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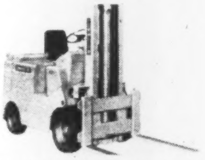

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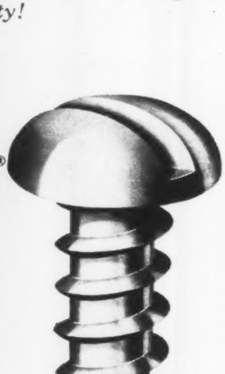

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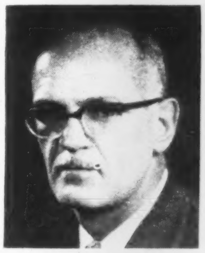


EVERETT P. PARTRIDGE
Director, Hall Laboratories, Pittsburgh

C. H. GALLAWAY
Vice President, Safety-Sun Glass Div., American Optical Co., Southbridge, Mass.

R. T. PRING
Technical Director, Dust & Fume Control Div., Wheelabrator Corp., Mishawaka, Ind.

spirally wrapped around clean metal pipe. Predominant in this field are the polyvinyl and polyethylene tapes.

These are on field test on fairly long sections of pipelines, but a final answer to their ability to provide protection for the life of the pipelines will not be known for another five to ten years. One disadvantage is that they cannot be easily applied to flanged connections, valves, and fittings.

The development of the catalytic setting, coal tar epoxy coatings has created considerable interest. They can be easily cold applied to the pipe to a thickness of 20 to 30 mils in one or two coats. The coating is hard, yet ductile, has extremely good bonding qualities to steel, cannot easily be removed or damaged, and may be applied either to welded pipelines or to valves, fittings, and flanges.

The coating is also unusual in that it is not affected by soil stresses and is not easily punctured by stones or debris in the pipeline backfill. Increase in temperature of a pipeline increases the hardness of the coating rather than softening it.

Industry Eyes Dry Chemical For First-Aid Fire Fighting

—WALTER MORGAN

Dry chemical as a fire extinguishing agent came into its own shortly after 1950.

Before that time, carbon dioxide had been used almost exclusively for extinguishing fires involving flammable liquids or electrical equipment. It had many qualifications to recommend it.

During the last seven years, those responsible for fire protection have come to realize that dry chemical, although it has the drawback of being a fine granular powder and therefore messy, is a more efficient fire extinguishing agent for use on electrical (it is a nonconductor) or flammable liquid fires, particularly where contamination is no problem.

The growing philosophy today seems to be, "Let's get the fire out as fast as possible and worry about the residue later." As a result, 1957 saw sales of dry chemical portables approach those of carbon dioxide extinguishers.

Dry chemical portables will continue to be used more for smothering Class B and C fires, particularly outdoors. Spokesmen for the industry estimate that by 1962 sales of dry chemical will surpass those of carbon dioxide.

Maintaining Quality of Water Is Measure of Management

—EVERETT P. PARTRIDGE

The least appreciated fact about industrial water is that we must all co-operate to keep it available for re-use at the lowest cost to the consumer.

No one else can pay the bill for industry's most important raw material.

The old idea that industrial wastes should be diluted as much as possible and flushed away simply won't do for our burgeoning industrial future. Instead, we must concentrate on developing a system of waste segregation, compatible with the treatment requirements of each contaminant, in the smallest practical amount of water. Only then shall we be able to keep to a minimum the cost of treatment, disposal, and conditioning of water for re-use.

Industry consumes only 2 per cent of the water it draws, returning 98 per cent to the source. How well each plant maintains the quality of the water it borrows and passes on to the next user will soon be a major measure of responsible management.

Safety Equipment Advances Geared to New Technology

—C. H. GALLAWAY

This will be a year of expansion through research. New areas of development have created new hazards in personal safety. Missile, satellite, supersonic, and similar terms have become common in everyday conversation.

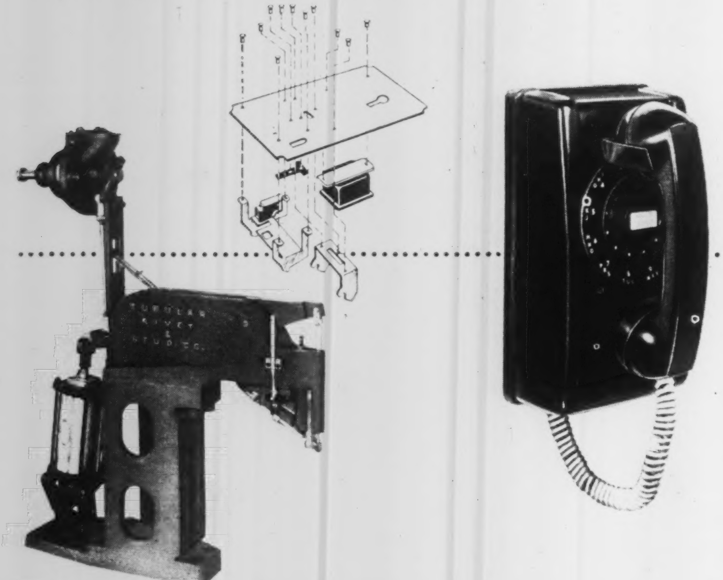
Research and engineering will play an important role in the development of safety equipment in these fields. We must provide the means for personal safety in areas ranging from radiation hazards to the dangers encountered in space travel.

Our primary objective will be to provide the means for maximum personal safety in industry. This year will be one of product refinement and development to give the customer the product he needs. New materials and processes will be utilized to give the worker maximum safety, more comfort, and a better looking product.

Shell Evacuation Fume Control Being Tried on Arc Furnaces

—R. T. PRING

The installation of fume control systems for electric steel melting furnaces is continuing at an accelerated



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Tubular's RIVETS AND RIVETERS HELP *Western Electric**

Maximum Efficiency Requires Flexibility

A substantial reduction in the cost of assembling components of the wall-phone base-plate resulted when engineers from Western Electric's Indianapolis Works and *Tubular* solved a fastening problem — they developed a Multi-Head Riveter assembly consisting of 11 automatic, air-operated machines. A bank of 5 riveters was joined to a 6-machine bank by a bridge with a rolling fixture. This method replaced the preliminary fastening plan which was based on 40 operations, 2 machines and 2 operators. The new Multi-Head assembly reduced estimated fastening labor costs about 35%. When production requirements increased tremendously, an additional nominal investment modified the bridge and added a second rolling fixture. Two operators were then easily able to boost the production rate an additional 60%.

***WESTERN ELECTRIC**

Western Electric, manufacturing and supply unit for the Bell System, produces telephones, wire and cable, switching systems; and in addition, makes important contributions to defense projects such as DEW Line and Nike Guided Missile Systems.

TUBULAR of Quincy

If assembly speed is an important factor in your own cost picture, take the time right now to learn how *Tubular's* Rivets and Automatic Riveting Machines may help you. *Tubular's* Riveters can feed and set one, or as many as 12 different rivets on different planes at one time. Call our nearest office or send us your blueprint, at no obligation, for complete information and technical help.

Tubular Rivet
& STUD COMPANY
WOLLASTON (QUINCY) 70, MASS.

FASTEN AUTOMATICALLY
BETTER and FASTER
with TUBULAR'S RIVETS
and MACHINES

MIDWEST OFFICE & WAREHOUSE — CHICAGO
BRANCH OFFICES: ATLANTA • BUFFALO • CHARLOTTE • DALLAS • DETROIT
INDIANAPOLIS • LOS ANGELES • NEW YORK CITY • PHILADELPHIA • ST. LOUIS
SAN FRANCISCO • SEATTLE

See your local classified directory for phone numbers

W. A. FESSLER
Director of Research & Development,
Daubert Chemical Co., Chicago

rate. We can now evaluate the various methods of ventilation at the furnace in terms of economics and their effects on metallurgy.

A new installation on the West Coast employs shell evacuation in place of exhaust hoods for ventilation of two arc furnaces which are 10 ft in diameter. Another project nearly ready for operation in the Midwest uses shell evacuation of larger furnaces. A comparison of those installations with others using exhaust hoods will provide valuable information on whether shell evacuation is feasible.

The adoption of oxygen converters to steelmaking in this country has introduced a new air pollution control problem which is being evaluated.

The use of cloth filtration with a filter aid for cleaning atmospheric air for ventilation of electrical equipment in steel mills has been favorably received; several large installations scheduled for completion in 1958 will provide comparative data on air cleaning methods.

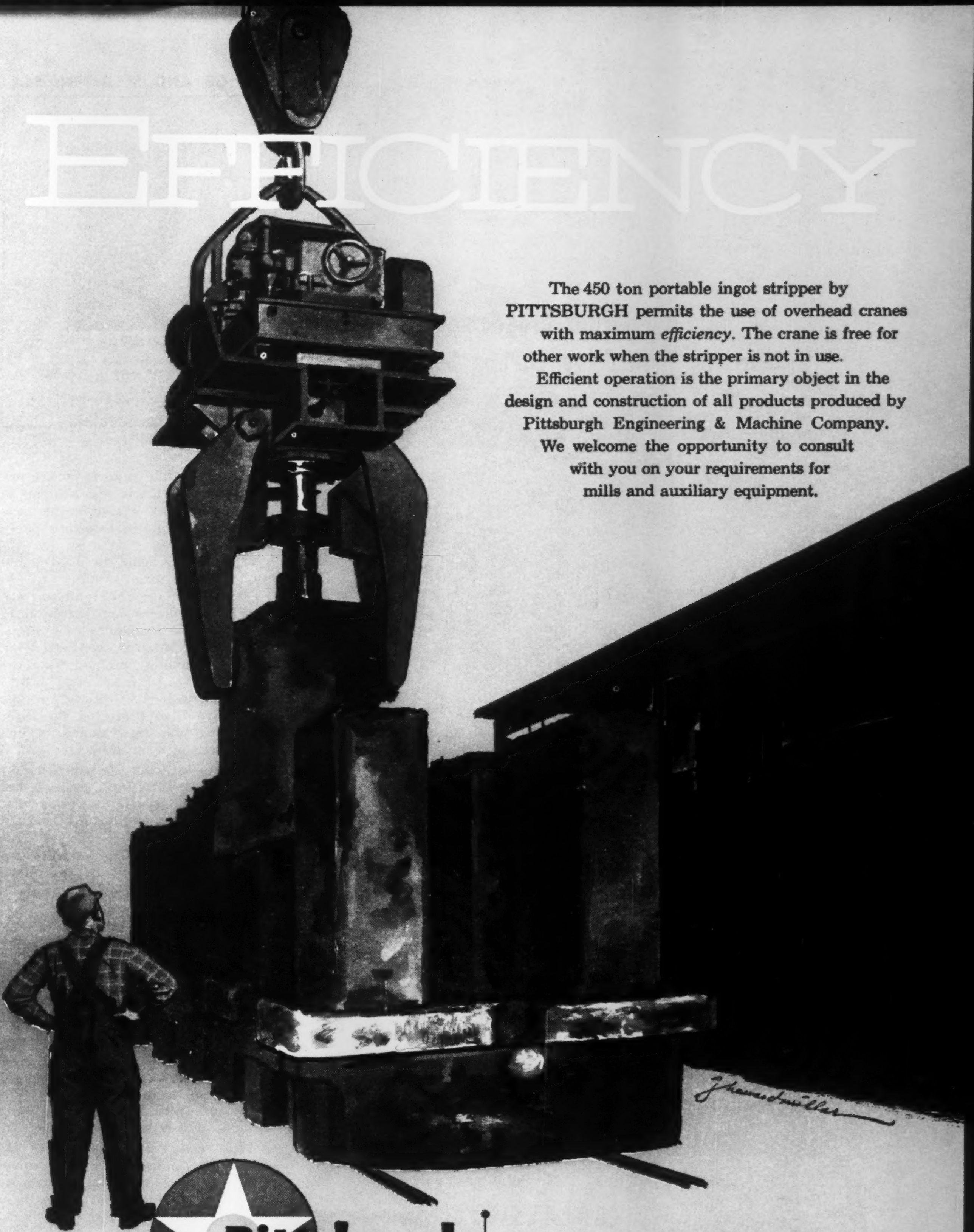
Volatile Corrosion Inhibitors Used on Paper, Film, in Oil

—W. A. FESSLER

Uses of volatile corrosion inhibitors (VCI) are gaining steadily. They are most commonly used in the form of impregnated or coated paper. Ferrous metal parts that are stored or shipped in such paper remain rust-free and ready for immediate use upon removal of the covering.

A major supplier of this paper recently introduced a transparent heat-sealable film with VCI on one side. The material is expected to find extensive use where eye appeal is de-

EFFICIENCY



The 450 ton portable ingot stripper by PITTSBURGH permits the use of overhead cranes with maximum *efficiency*. The crane is free for other work when the stripper is not in use.

Efficient operation is the primary object in the design and construction of all products produced by Pittsburgh Engineering & Machine Company. We welcome the opportunity to consult with you on your requirements for mills and auxiliary equipment.

Pittsburgh
ENGINEERING
& MACHINE CO.

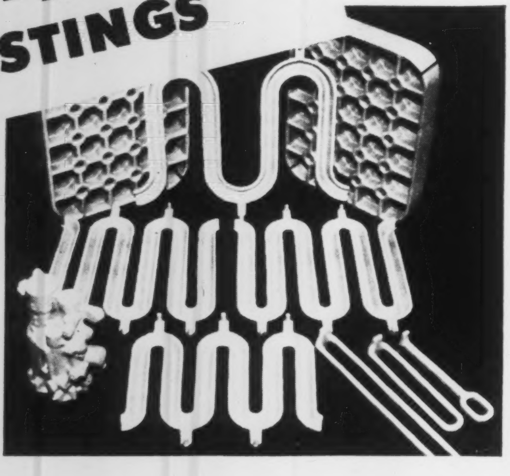
P. O. BOX 986, PITTSBURGH 30, PENNSYLVANIA
PLANT AT GLASSPORT, PENNSYLVANIA
Division of Pittsburgh Steel Foundry Corporation

"Electric and Open Hearth Steel Castings from 1 lb. to 100 tons"

Announcing

a significant broadening of
Duraloy High Alloy Casting Service...

SHELL - MOLDED CASTINGS



DURALOY

We are now in position to accept and process substantial orders for shell-molded castings in the Chrome Iron, Chrome Nickel class.

Shell-molded castings provide several values over conventional castings:
a . . . dimensions are exceptionally accurate
b . . . thinner walls are practicable
c . . . surface finish is superior

Shell-molding is ideal for mass or repetitive production of parts particularly those with intricate design.

With our conventional static and centrifugal casting service now broadened by our shell-molded casting service, we are in a better position than ever to serve industry in connection with its high alloy casting requirements. May we quote on your casting requirements that call for shell-molding?

The DURALOY Company
OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE 12 East 41st Street, New York 17, N. Y.
ATLANTA OFFICE 76—4th Street, N.W.
CHICAGO OFFICE 332 South Michigan Avenue
DETROIT OFFICE 23906 Woodward Avenue, Pleasant Ridge, Mich.

C. FRED YTTERBERG
President, Kalman Floor Co. Inc.,
New York

sired to stimulate sales or where immediate inspection of stored items is needed. Another manufacturer has proposed adding VCI to plastic packages.

VCI is also being used in liquid and powdered form.

Oils containing the inhibitor are effective in preventing corrosion in equipment or containers in storage. Protection continues even after the oil has completely drained from the metal surface. Empty steel drums (55-gallon capacity) stored in the open have been protected for three years with only three ounces of VCI oil sprayed in each drum.

Aqueous systems are benefiting by VCI. A proprietary composition has alleviated the severe corrosion that occurs in cans and drums containing polyvinyl acetate latexes. The VCI material added to the latex prevents corrosion both in the liquid phase and on the metal surface above the liquid level.

Modern Handling Methods Are Hard on Plant Floors

—C. FRED YTTERBERG

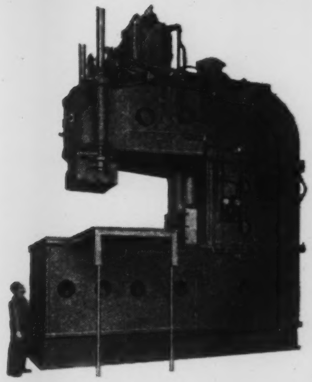
Improved material handling methods put an increasing load on the plant floor. Although truck wheels are rubberized, they are smaller and help concentrate the load on a smaller area. Loads are greater, too.

Floor construction techniques are constantly improving. New equipment has been designed. It has been tested on the job, and crews have been trained in its use. Another technological advance is the lowering of the water ratio in cement, providing greater strength and density.

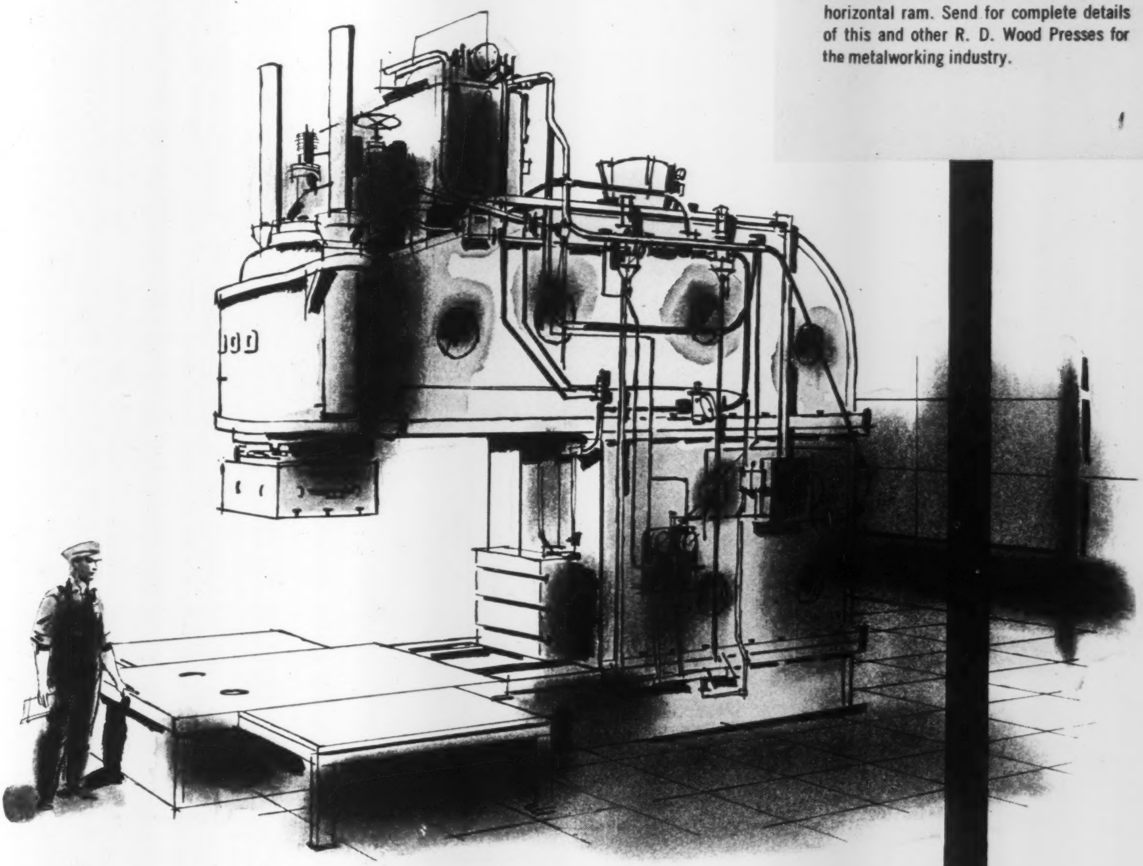
Our advice to those planning new construction would be to restrict the

There's always a job for a Wood Press . . .
and a Wood Press to do the job

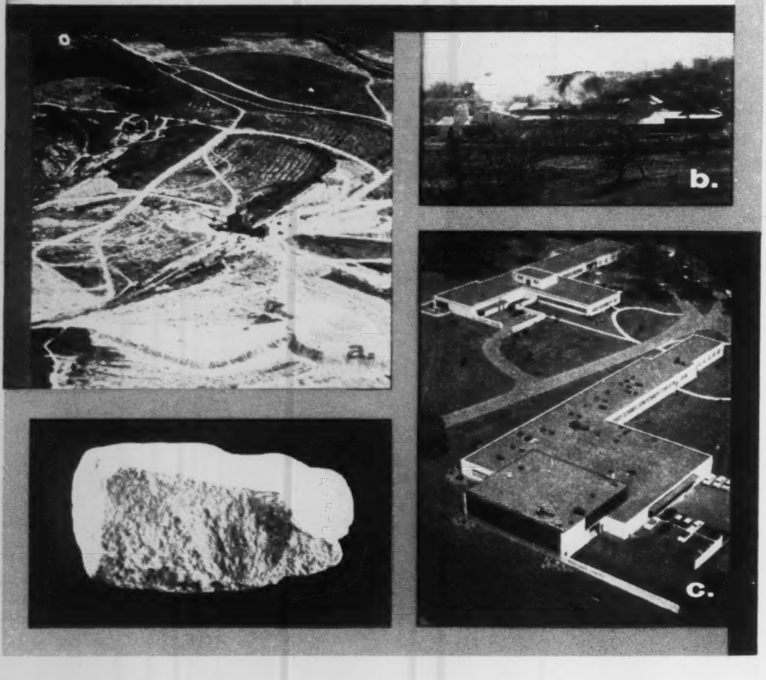
When you want a production shortcut—when downtime and costs need shrinking—there's a job for a Wood Press. And in almost every type of metalworking operation—there's a Wood Press to do the job. R. D. Wood makes standard presses for an amazing range of uses, besides designing others for special work. All have three things in common: sound design, carefully chosen materials, conscientious workmanship. *Result:* R. D. Wood Presses consistently deliver the utmost in smooth, dependable performance; fast, economical production; trouble-free operation. Write for catalog and engineering information—without obligation.



750 ton, HydroLectric open gap, self-contained press for straightening, flanging, forming, forcing and bending operations. Handles all metals. Valve system contains centralized controls for both main ram and horizontal ram. Send for complete details of this and other R. D. Wood Presses for the metalworking industry.



R. D. WOOD COMPANY
PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA



Chemstone **earns** its place as your **fluxstone** supplier

Steel is *big* . . . and suppliers of commodities to steel must be big, too. Chemstone's operations meet these requirements from three all-important standpoints:

a. **THREE QUARRIES**—the one shown above is 3,000 acres of purest limestone strata.

b. **PLANTS**—Strategically-located, high-capacity, modern facilities . . . an integrated plant-rail-dock-boat network . . . the kind of operation you can count on for fast, sure, on-schedule deliveries.

c. **RESEARCH CENTER**—where unceasing work goes on in the metallurgical application of fluxing limestones.

Chemstone—and its parent company—Minerals & Chemicals Corporation of America is geared to give steelmakers full service. We invite your inquiry.

WORLD'S LARGEST NON-CAPTIVE FLUXSTONE PRODUCER

Chemstone
CORPORATION

LEADER BUILDING, CLEVELAND 14, OHIO

a subsidiary of
MINERALS & CHEMICALS
CORPORATION OF AMERICA

Pittsburgh, Pa. Representative:
NEVILLE LIME COMPANY
Oliver Building

L. J. CATLIN
Chief Chemist, Industrial Filtration Co., Lebanon, Ind.

over-all size of the building and put greater emphasis on quality floors. They are perhaps the most important element of the building.

If a new floor cannot be put down, resurfacing with a dense, hard aggregate topping will meet an economical budget and yet provide a tough floor. Where new floor construction is being specified, some of the advantages of a heavy duty topping can be achieved through the application of a hard aggregate wearing surface.

In the long run, a granolithic topped floor, having a minimum wearing course of $\frac{3}{4}$ in., is most satisfactory and will withstand many years of hard usage.

Coolant Filtration Improved; Many Problems Yet To Solve

—L. J. CATLIN

New demands are constantly being made upon filter manufacturers for ultimate perfection in the solution of industrial filtration problems. These point in many directions:

1. Better filtration in the micronic range.

2. Higher flow rates to conserve factory space.

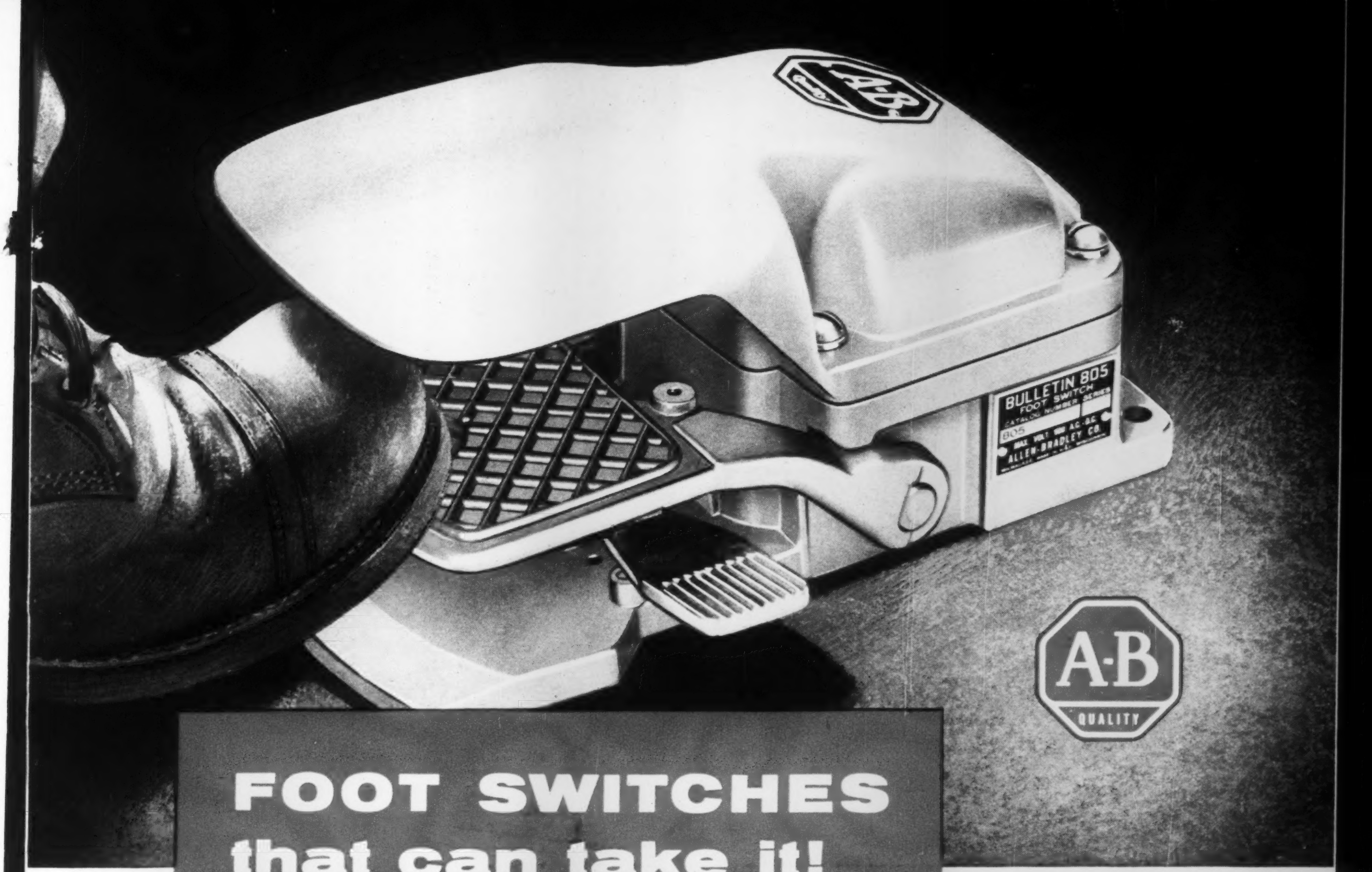
3. Automatic controls and automatic cleaning of the filters.

4. Larger and more complicated central systems, including storage tanks and service lines.

5. Handling higher concentrations of sludges, including wash waters which plug sewers and contaminate public water supplies.

6. Saving enough waste products to pay off the investment in filtration equipment.

Not all of these demands can be



FOOT SWITCHES that can take it!

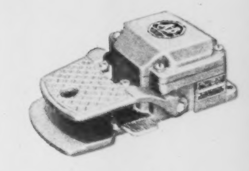
• **BUILT FOR THE TOUGHEST SERVICE** inside and out—from the maintenance free, snap action, double break, silver alloy contacts to the rugged, die cast aluminum housing—the redesigned Allen-Bradley Bulletin 805 foot switch is a challenge to tough jobs! The on-center treadle operation eliminates the need for bolting down the switch—the extended base keeps it from tipping.

• **VERSATILE OPERATION**—The contact trip point is easily adjustable. When equipped with two contact blocks, this foot switch can be set for simultaneous or two-stage operation. The Bulletin 805 foot switch can also be furnished with a latch to provide maintained contact operation. In addition, this latch, when desired, can be made inoperative, and may be quickly changed from one to the other side of the foot switch.

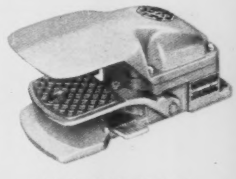
The Bulletin 805 housings are available for NEMA Type 4 watertight and oiltight applications, or NEMA Type 7 explosion-proof service.

Try the Allen-Bradley Bulletin 805 foot switch—you'll find it "tops" in its field. Send for full information.

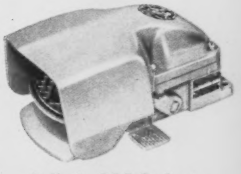
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.



Bulletin 805 Style A switch with latch.



Bulletin 805 Style A switch with latch and top guard to prevent accidental operation.



Bulletin 805 Style A switch with latch and guard covering both top and sides.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

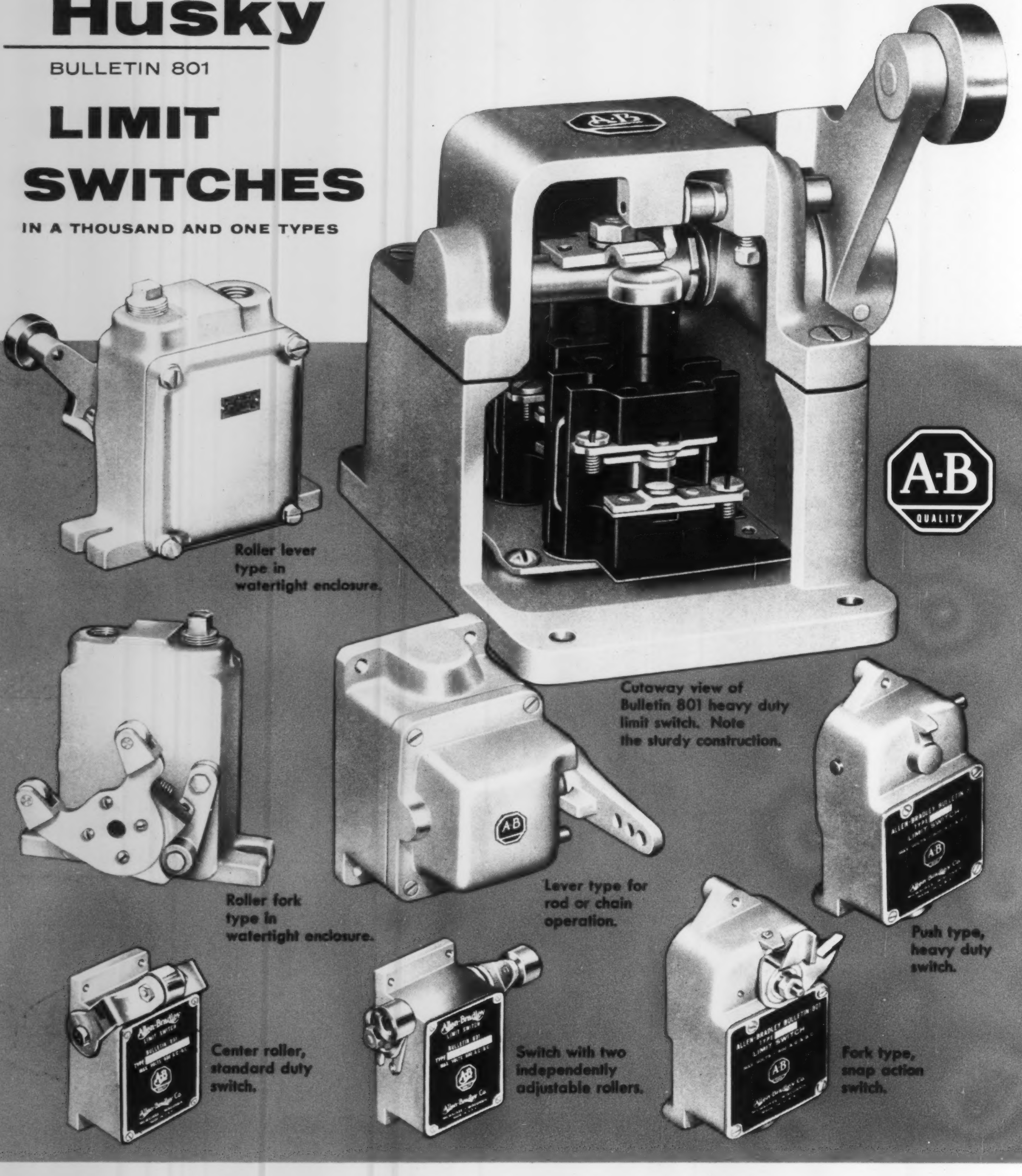
1-58-MR

Husky

BULLETIN 801

LIMIT SWITCHES

IN A THOUSAND AND ONE TYPES



Roller lever type in watertight enclosure.

Cutaway view of Bulletin 801 heavy duty limit switch. Note the sturdy construction.

Roller fork type in watertight enclosure.

Lever type for rod or chain operation.

Push type, heavy duty switch.

Center roller, standard duty switch.

Switch with two independently adjustable rollers.

Fork type, snap action switch.

From among the hundreds of Allen-Bradley Bulletin 801 general purpose limit switches, you're sure to find your exact requirements. There are 21 different contact arrangements available, including types with single or multiple poles, N.O. and N.C. contacts, spring return or maintained contacts, with either a slow or snap action mechanism. It will pay you to know this *quality* line of limit switches. If you do not already know this quality line, let's get acquainted. Write for the complete story.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

1-58-MR

C. H. HEMPEL
President, Heresite & Chemical Co.,
Manitowoc, Wis.

met in the factory of the filter manufacturer. They require co-operative study by operators to discover and remove bottlenecks that hamper smooth and efficient operation.

Notable progress has been made in such lines as cast iron grinding coolants; filtering water from dust collectors; copper wire drawing; aluminum foil rolling; ceramics and glass grinding coolants; plastic and stainless steel polishing coolants; piston ring, ball bearing, lapping, and honing coolants.

Coatings Combat Corrosion, Contamination in Atomics

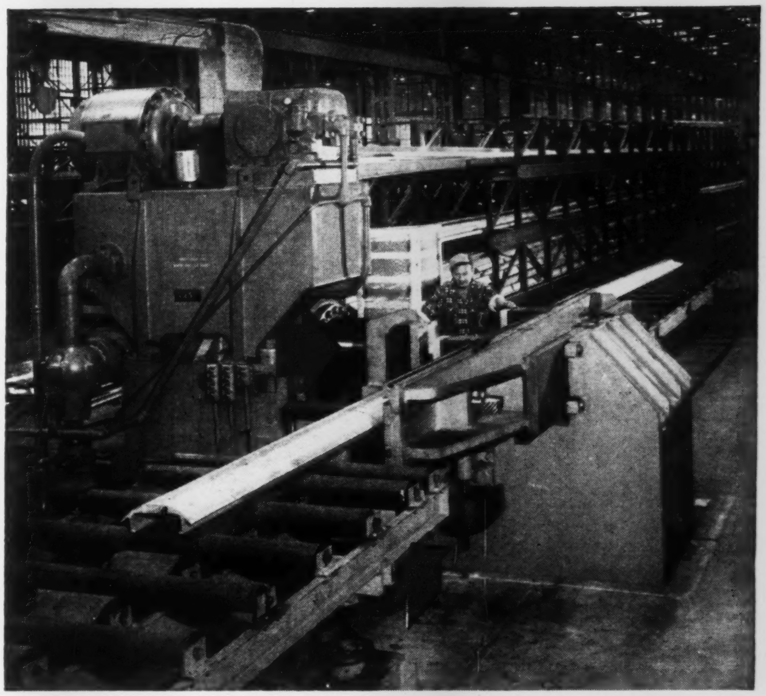
—C. H. HEMPEL

The increasing number of new chemical products in industry imposes new corrosion problems. These are often solved with organic coatings.

Choice of coating is dictated by the environment. Inhibitive primers in phenolics, vinyls, oils, and alkyds are used to combat atmospheric corrosion. Immersion in fresh or sea water requires coatings made of phenolics, vinyls, or synthetic rubber derivatives. Baked phenolic resin coating is used extensively in the chemical, petroleum, textile, paper, and other industries at temperatures to 450 F.

In the appliance field, where the alkyd-amino resin coating is used, a primer coat of baked phenolic improves the moisture and chemical resistance of the coating system.

Air drying and baked phenolic coatings have been helpful in solving many of the corrosion and contamination problems brought about by the advent of atomic energy, nu-



Live-roller conveyor moves work into press. Conveyor moves up or down to position work in die. Ram moves forward to straighten work. Entire installation, including press and conveyor, designed and built by Farquhar.

Kaiser Aluminum uses this Farquhar
HORIZONTAL BULLDOZER PRESS
for fast-cycle straightening

Aluminum extrusions, fed *continuously* to the press on Farquhar Live-Roller Conveyors, are straightened in a *fast-cycle operation* on this Farquhar 500-ton Horizontal Bulldozer Press. This efficient set-up is installed at the U. S. Air Force Heavy Press plant operated by Kaiser Aluminum & Chemical Corporation in Halethorpe, Maryland. In their own words this press is used "to eliminate natural bows and deformations which develop in some aluminum extrusions after they have been heat treated."

Like Kaiser Aluminum, major plants in this country have found that these Farquhar Horizontal Bulldozer Presses provide high production at low unit cost. Fed either by crane, overhead or in-line conveyors, they are used to economically forge, stamp, straighten or form parts in an efficient, fast-cycle operation.

Write for complete information on Farquhar Horizontal Bulldozer Presses or, better still, ask for our proposals or recommendations.

Farquhar Special Machinery Department . . .
Our qualified staff will build your special machinery economically—your inquiry will receive prompt attention.

A. B. FARQUHAR DIVISION
The Oliver Corporation
Press and Special Machinery Departments
York 56, Pennsylvania

OLIVER
Farquhar PRESSES
Also Manufacturers of Farquhar Conveyors

weldments as you want them...

For half a century, Kirk & Blum skilled craftsmen have been saving time and money for outstanding manufacturers. Whatever the weldment required, these experienced artisans know the most efficient technique to do the job accurately and quickly.

This know-how, plus modern Kirk & Blum equipment, assures high quality sheet steel and alloy fabrication.

Fabrication of guards, tanks, machine bases . . . all types of semi-finished and finished weldments . . . are available from Kirk & Blum to your exact needs.

Let K & B bring your drawings to life. Write for booklet, or send your prints for prompt quotation.

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SHEET & PLATE FABRICATION

ORVILLE C. HOGNANDER
Vice President, G. H. Tennant Co.,
Minneapolis

clear reactions, and radioactive isotopes. Air drying phenolics are easy to apply and can be readily decontaminated with strong solvents, acids, or alkalies. The baked phenolics withstand high temperatures and highly corrosive reactants.

In the newer corrosion resistant coatings we find the fluorcarbon polymers and the silicones, both of which find limited use because of the difficulty of application and high cost.

In the near future, we will see the greatest advancements in the application of coatings. There will be modifications and improvements in present coatings, but more progress may be expected in automatic application procedures.

Vacuumized Floor Sweepers Have Dust Filter Systems

—ORVILLE C. HOGNANDER

Two important developments in mechanized sweeping should be of cost-saving interest to metalworking plants in 1958.

First is the introduction of large-capacity vacuumized sweepers for rapid pickup of salvageable metal dusts and litter in foundry yards and similar areas. Until now, industrial sweepers have lacked the capacity for such work.

A typical new unit for large yard and plant areas sweeps a path almost 7½ ft wide at speeds up to 15 mph. Its three brooms rotate inside vacuum-connected housings. It has a new type filter system that removes particles as small as 5 microns (1/5000 in.) in size.

Since the metal content of dust in

(Advertisement)

BRIEFS for buyers of

Molten Salt Bath Cleaners
Caustic Soda
Muriatic Acid
Trichlorethylene

You save up to 75% with this new cleaner for castings

If you use an electrolytic salt bath to desand castings, you can make real economies with VIRGO® Electrolytic Salt, a new, yet well-established Hooker product.

You pay less for VIRGO Electrolytic Salt. Savings can be as much as 75% over comparable salts.

With this product, you remove sand, scale, graphite, and other surface impurities from iron and steel castings in 15-20 minutes. You get a chemically clean surface.

No acid dip. This VIRGO salt works the same as other electrolytic salts, in an 850-900° F. bath, at 6 volts or less. The process requires no acid, unless it is a prerequisite for subsequent operations.

The electrolytic action of the bath leaves casting surfaces resistant to rust; helps *keep* them clean while they await further processing.

To prove for yourself that VIRGO Electrolytic Salt can clean your castings—*for less money*—write us about submitting samples of your work for test cleaning. If you'd like technical data only, just check the coupon.

2 other specialized VIRGO products

Keep your process file up to date with the latest information on these other VIRGO metal cleaning compounds:

1. VIRGO Descaling Salt. For descaling titanium or stainless steel sheet, strip, wire, rods, tubes and other forms quickly, economically, without attacking the base metal.

2. VIRGO Molten Cleaner. Compounded especially for reclaiming parts loaded with rust and organic deposits.

For literature, check the coupon.

65% larger area

You can empty this caustic soda faster

Whether your operators scoop, pour, or shovel flake caustic soda, they'll find this new Hooker drum easier, faster, and safer to work with.

The opening on this new drum is a full 18 inches in diameter—an increase of 65% in opening area. When the drum is inverted, caustic can't pile up around the inside as it does with other standard drums.

You pay no extra for this drum. So if you've been paying a premium price for full-open-head drums of flake caustic, you can now get many of the same advantages, at standard prices. Just specify Hooker caustic soda in the 18-inch-opening drum.

Easy way to figure dilution of muriatic acid

A mark on the coupon will bring you a technical data sheet that shows at a glance how much Hooker muriatic acid you need to make up solutions of various strengths.

The same sheet gives some good advice on the safe handling of muriatic acid, and the specifications of Hooker muriatic.

Even a quick glance at the specs is likely to convince you that the purest muriatic you can buy anywhere is "*Hooker White*" grade. Entirely free of arsenic and free chlorine, this grade contains no more than .003% sulfates, .0001% iron.

You'll discover that our *Commercial Grade* muriatic is only slightly less pure: iron, .0005%; free chlorine, a trace; sulfates, .003%; organic matter, .001%; arsenic, none.

Both grades are available for your use in rubber-lined tank cars in 18°, 20°, and 22° Baumé strengths.

How to cut degreasing costs

You may have wondered if there isn't some way to extend the time between degreaser cleanouts, to get more use from the trichlorethylene you buy.

Well, there is. You see, all trichlorethylene is protected by a stabilizer against heat, light, air, moisture, acids, and active metals such as aluminum.

During normal use, the stabilizers in some brands of trichlorethylene tend to "wear out" or become depleted. That's why you may have to add new stabilizer. Eventually, if stabilizer is not replenished, the bath will "go sour."

But—when you use NIALK® TRICHLORethylene in your degreaser, you *never* have to add fresh stabilizer! You stand a better chance of going a long time between degreaser cleanouts. Why?

NIALK (and *only* NIALK) has **psp**—permanent STAYING power—in its neutral stabilizer. The stabilizer *can't* wear out during normal use. Even after repeated distillations, it's still active—protecting your parts against staining, keeping the bath from "going sour."

If you'd like to learn more about NIALK TRICHLORethylene and what it can do for your degreasing operations, just check the coupon.

Check items on which you'd like more information:

☐ VIRGO Electrolytic Salt
☐ VIRGO Descaling Salt
☐ VIRGO Molten Cleaner
☐ Caustic Soda
☐ Muriatic Acid
☐ NIALK TRICHLORethylene

Clip and mail to us with your name, title, and company address.

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1201 FORTY-SEVENTH STREET, NIAGARA FALLS, N. Y.

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In Canada: Hooker Chemicals Limited, North Vancouver, B. C.

...the perfect way
NOT
to buy fasteners!

When you purchase FASTENERS, your first considerations should be given to quality, delivery and prices.

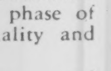
Chandler, as a leading manufacturer of cold forged cap screws, takes the same considerations. Mass production is only part of their story . . . but absolute control during every phase of production means top quality and uniformity.

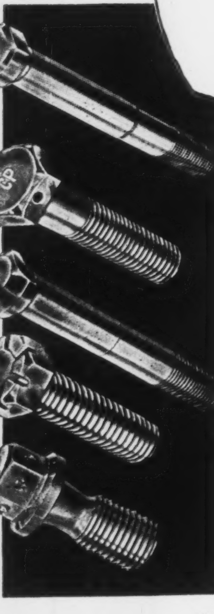
Realistic pricing is important . . . and is followed.

If your requirements include automotive, Place self-locking, connecting rod or aircraft engine bolts in high carbon alloy and stainless steels, check with Chandler today. They are prepared to produce special heads, drilled heads and shanks, and ground bolts to tolerances as close as 0.0005-inch.

Write today for literature.

Specialists in Thread-Rolling
after Heat Treating.





CHANDLER
PRODUCTS
CORPORATION
1488 Chardon Road • Cleveland 17, Ohio

6473-CH

J. T. RYAN JR.
President, Mine Safety Appliances Co., Pittsburgh

many plants runs as high as 45 to 55 per cent, improved sweeping techniques (keeping air-borne dust to a minimum) will be a factor in controlling salvage costs in 1958.

A second development carries mechanization a step further, but in the opposite direction—to congested areas now swept by hand. Compact vacuum-equipped sweepers have been introduced. The units are small, maneuverable, and have an average capacity two to five times that of a manual broom. Dirt pickup is almost "100 per cent dust-free."

Electronic Instruments Guard Fire Hazard Areas

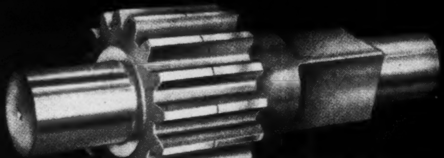
—J. T. RYAN JR.

Modern instrumentation and fire fighting devices, combined with standard safety and first aid equipment, give fire protection undreamed of a few years ago.

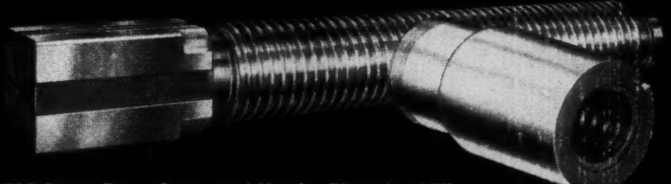
Automatic sampling devices detect and measure a myriad of flammable gases and vapors. Some installations include multiple sampling stations throughout the potential hazard areas of a complex plant.

Quantities of the atmosphere are "inhaled" at each station for analysis. Some instruments convey the sample through tubes to a central testing panel; others test the sample on the spot, then relay the information to the central control panel.

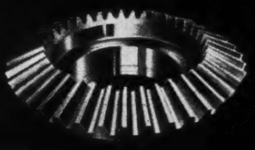
A system can be designed to provide visual or audible warnings, or both, so an operator on duty can be alerted to dispatch a repair crew or take other precautions. Other instruments activate automatic control units to turn off valves, make com-



TSP Shaft Pinion for Ore Unloaders

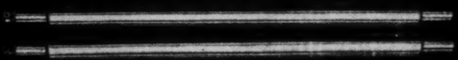


TSP Screw Down Screw and Nut for Blooming Mill

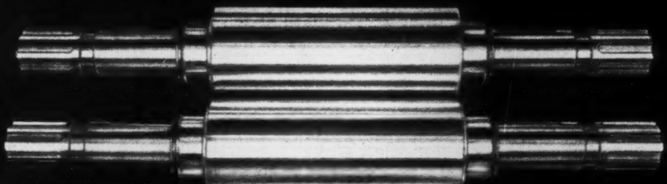


TSP Cone Crusher Gears

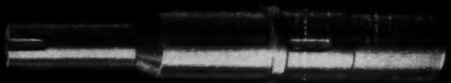
TSP Brake Wheels



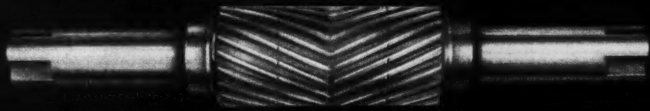
TSP Leveller Rolls for Steel Mills



TSP Rolls for Steel Mills

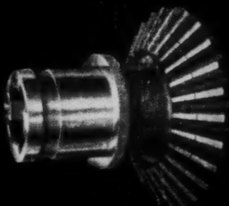


TSP Crane Wheel Axles

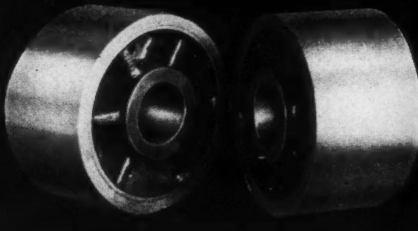


TSP Pinions for Steel Mills

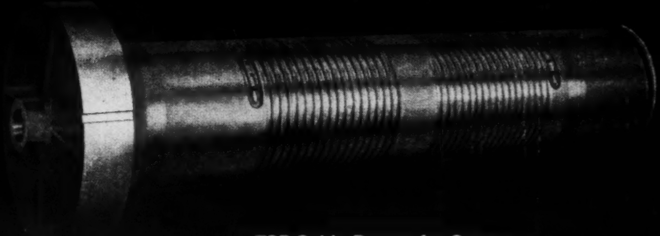
TSP Sprockets



TSP Edging Mill Bevel Gears



TSP Trunnion Rolls for Kilns

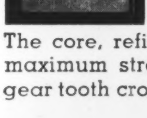


TSP Cable Drums for Cranes

TSP hardened parts can save you thousands of dollars

"Tool Steel Process" hardened parts give you savings in maintenance, replacement, and production.

TSP products are long wearing, need hardly ever be replaced . . . and are so carefully designed and made, that your equipment runs longer and more economically. In wide usage in practically every industry, they are guaranteed in writing to outlast, out-perform any competitive part in the same service. Their phenomenally long wearing qualities are a result of our special hardening process. The file hard surface to the full depth of permissible wear gives maximum life. The core, refined for toughness and ductility, gives maximum strength. Note the depth of hardness on gear tooth cross section.



TSP hardened parts, a few of which are illustrated, are made to order from your blueprints, or to fit existing equipment. Gears made in sizes to 90" diameter. Other products up to 20,000 lbs. weight. Write for Bulletin 352 "Why Are They Called TSP Products" and complete information about TSP applications for your equipment.

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GEAR AND PINION CO.
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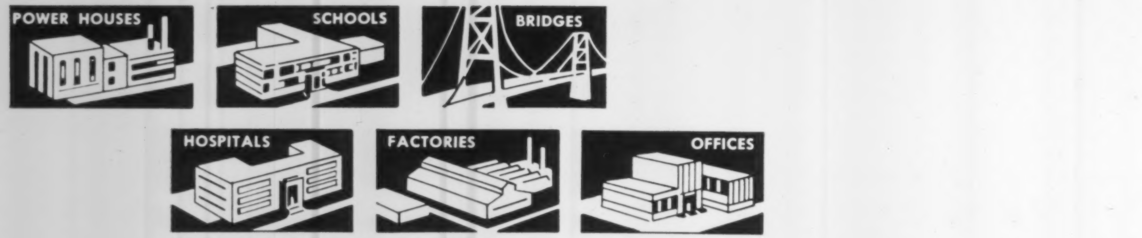
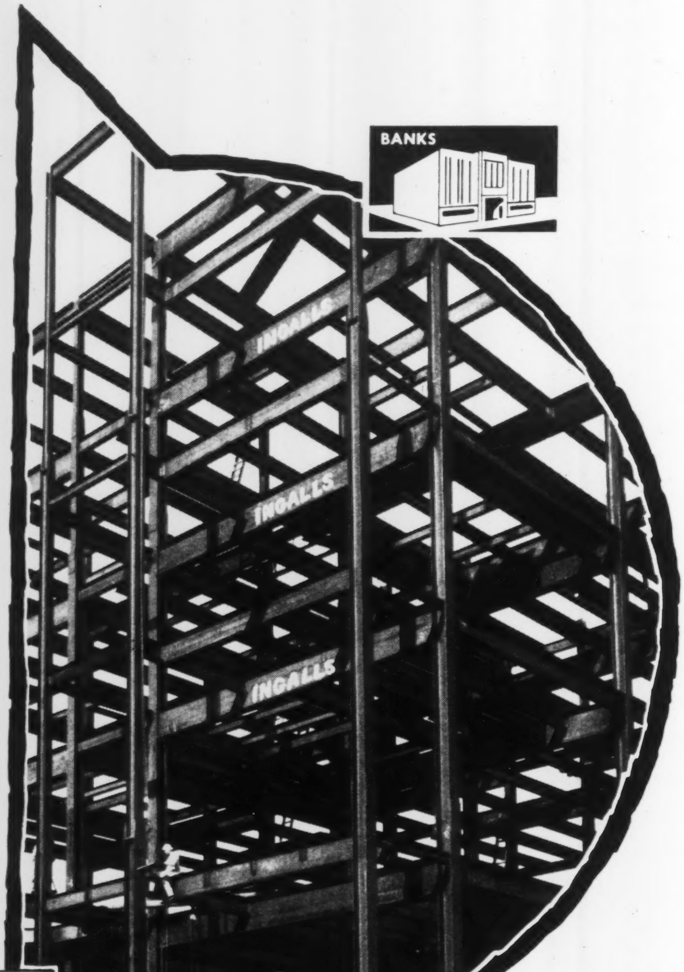


How INGALLS serves the construction industry



One of the big functions of the Ingalls Industries is helping the construction industry perform its modern miracles.

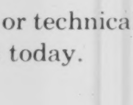
The Ingalls Iron Works Company furnishes the precise fabricated structural steel so essential to modern construction . . .

. . . The Ingalls Steel Construction Company *erects* steel for power houses, schools, office buildings, bridges and many other modern structures . . .

. . . Birmingham Tank Company, a division, furnishes platework, storage tanks and pressure vessels for a wide variety of applications.

Each has expanded production facilities, a wide range of technical skills, long experience, and harmony of intra-company effort for faster, more economical steel service to the construction industry.

For further information or technical assistance, contact Ingalls today.



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The Ingalls Shipbuilding Corporation, Shipyards: Pascagoula, Mississippi; Decatur, Alabama Sales Offices: New York, Chicago, Philadelphia, Washington, Houston, New Orleans, Atlanta

A. R. CORLETT
Executive Vice President, Harco Corp., Cleveland

pensating adjustments, or stop operations.

Supplementing these "fixed" instruments are a wide range of portable devices which are fast becoming standard industrial safety equipment.

Improvements are being made in fire fighting equipment, such as sprinkling systems, fire hoses, chemical extinguishers, and personal protective equipment.

One of the most recent developments is the fire approach suit, a flexible, lightweight, aluminized asbestos coverall into which is fed a stream of cool oxygen. The outer surface reflects over 90 per cent of all radiant heat. Since oxygen is fed into the suit, the wearer can fight fires in areas in which there is not enough oxygen present to support life.

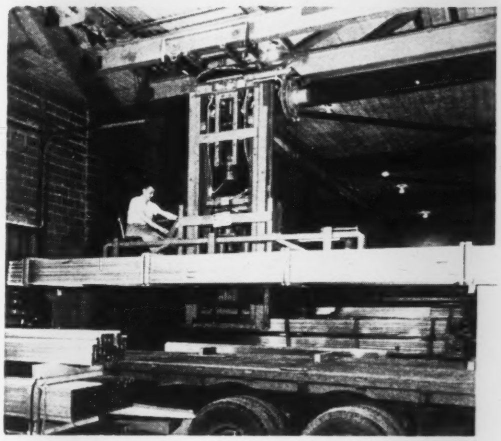
Cathodic Protection System Protects Metal Underground

—A. R. CORLETT

Corrosion control through cathodic protection of underground or submerged metal structures is a growing maintenance technique. In 1958, we expect to see even wider acceptance and broader application of this means of rust prevention.

Among the factors which promote the use of this approach to the preservation of plant investment are the potential hazards caused by leaks in gas, oil, and chemical piping; the economic losses of plant shutdown caused by utility failures or breaks in process piping; and the high cost of plant piping replacement.

Power cable failures, a cause of



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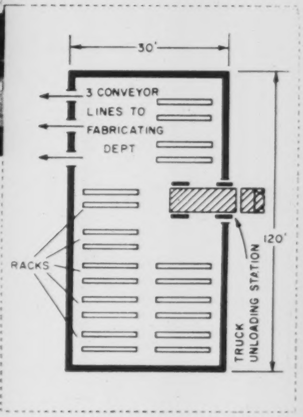


...and TRAK-RAK

handle complete warehousing operation

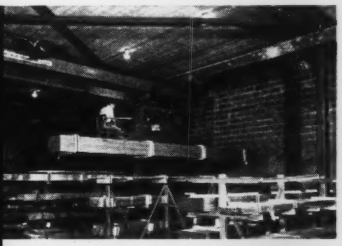
UNLOADS TRUCKS, STORES MATERIAL IN 1 OPERATION

When the Per-Fit Products Corp., Indianapolis manufacturer of aluminum windows installed a Chicago Tramrail TRAK-RAK unit in its warehouse, it gained 4 big advantages:

1. **Increased the capacity of existing storage area.**
2. **Reduced handling costs by permitting 1 man to handle the entire warehouse.**
3. **Kept production lines supplied with on-time material deliveries.**
4. **Handled high grade aluminum extrusions without damage.**

The TRAK-RAK unit installed at Per-Fit consists of a 1 Ton capacity underrunning crane from which is suspended an electrically operated rotating telescoping column which is fitted with a three-fork carriage. All operations of the TRAK-RAK unit are controlled by the operator, who rides with the carriage. The unit serves a series of self-standing racks equipped with arms which receive the bundled material. Because the TRAK-RAK column requires minimum operating space, the aisles between racks are very narrow.

Trucks delivering material are unloaded (top picture) by the unit, which moves over the tops of the racks (below) to the proper rack and deposits its load in 1 operation. When a particular bundle is required by production, the operator moves to the rack, picks up the bundle, and, moving overhead, travels to the conveyor lines (drawing) and sets the bundle down on the designated conveyor line.

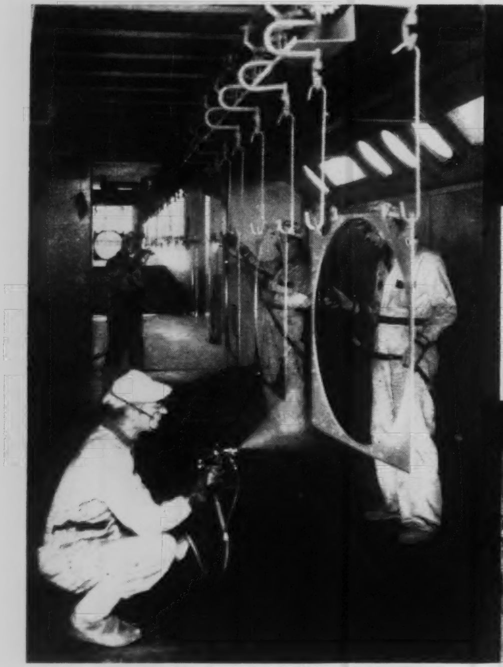


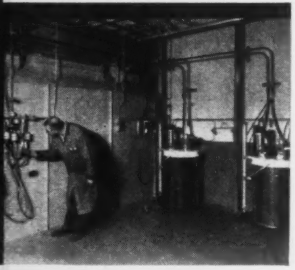
TRAK-RAK

TRAK-RAK Systems of vertical storage and handling are saving time and money in warehouses and production plants of all types. *For complete details on how TRAK-RAK can help solve your problems, write:*

CTC

CHICAGO TRAMRAIL CORPORATION
1326 S. Kostner Avenue • Chicago 23, Illinois





Above: Metal assemblies start 3-stage phosphatizing operation in the Mayville, Wisc., plant.

Left: With a steady flow of two enamel colors always available, production has doubled.

Below: Binks pumps send enamel to painters. Binks Dualheet heaters lower viscosity.

AT MAYSTEEL, BINKS SPRAY UNITS HELP

boost phosphatizing, priming and painting production by 200%

"Maysteel Products, Inc., makes sheet metal parts and finished products on contract. As part of our expansion program we needed a modern finishing system that would produce quality work on tight schedules. To help us solve the problem, we called in the Binks people," reports Maysteel's president, Mr. C. E. Stryker.

Working with Maysteel, here is the system Binks engineers developed. METAL PREPARATION: A three-stage conveyorized phosphatizing system was developed employing 384 Binks stainless steel spray nozzles. The nozzles completely bathe the metal parts in chemically treated water, wash water and chromic acid rinses. Materials are reclaimed and recycled.

METAL PRIMING: Continuing on the conveyor, parts pass through a drying oven into a 22' water wash spray booth. A Binks circulating system supplies primer to two painters using Binks Model 7 spray guns.

ENAMELING: After another oven drying, the parts are ready for hot-process enameling. Up to five painters using Binks Model 7 spray guns are supplied by a two-color circulating system. Binks Dualheet paint heaters, located just outside the booth, raise the enamel to 140° F. This eliminates the need for thinners and insures full-coat, sag-free coverage in a single pass.

Learn how Binks extensive finishing experience and equipment can be of benefit to you. There is no obligation. Just contact your nearest Binks Branch Office or, if you prefer, write direct to the address below.

Ask about our spray painting school
Open to all...NO TUITION...covers all phases

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EVERYTHING FOR
SPRAY PAINTING

SPRAY GUNS
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Binks Manufacturing Company
3122-30 Carroll Ave. West, Chicago 12, Ill.

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J. J. POWER JR.
Executive Vice President, Automatic Sprinkler Corp. of America, Youngstown

expensive production downtime, often are caused by corroding sheaths. Gasoline or other hazardous fluids have leaked into potable water reservoirs or into sewers causing explosive mixtures—all as a result of corrosion of underground piping. When corrosion leaks develop in high pressure pipings such as gasoline or natural gas lines, the losses of expensive products amount to much more than the cost of cathodic protection which would have prevented these losses.

Fire Protection Equipment Available for Specific Needs

—J. J. POWER JR.

Fire losses in the U. S. in 1956 totaled $989,290,000. Average loss for 1957 was about $90 million a month. This should spark a trend to more general use of industrial fire protection.

Many firms who suffer losses are underinsured. Too many American industrialists ignore potentialities for large-loss fires — combustible construction or building contents—until it is too late.

Technical developments have expanded the fire protection available to industry from automatic sprinklers to special fixed fire protection systems applying water, fog, foam, high or low pressure carbon dioxide, or dry chemicals. Some systems are used to supplement standard automatic sprinkler systems. Others are independent. Systems may be activated by a wide variety of fire detectors.

Size varies from small units protecting tiny "hot spots" to large ones

THE SHORTEST DISTANCE TO SILICON SAVINGS is a phone call to your nearest Vancoram Office!

VCA Engineering Sales and Technical Representatives will gladly study your problem and recommend the silicon products best suited to meet your requirements. That's because VCA produces *all* types and forms of silicon alloys from 25% ferrosilicon to silicon metal. In lump, crushed sizes and briquettes, and packed to suit your needs.

Remember – the lowest priced silicon product is not always the answer, for it may prove to be the most expensive in the end! Let us help you now.

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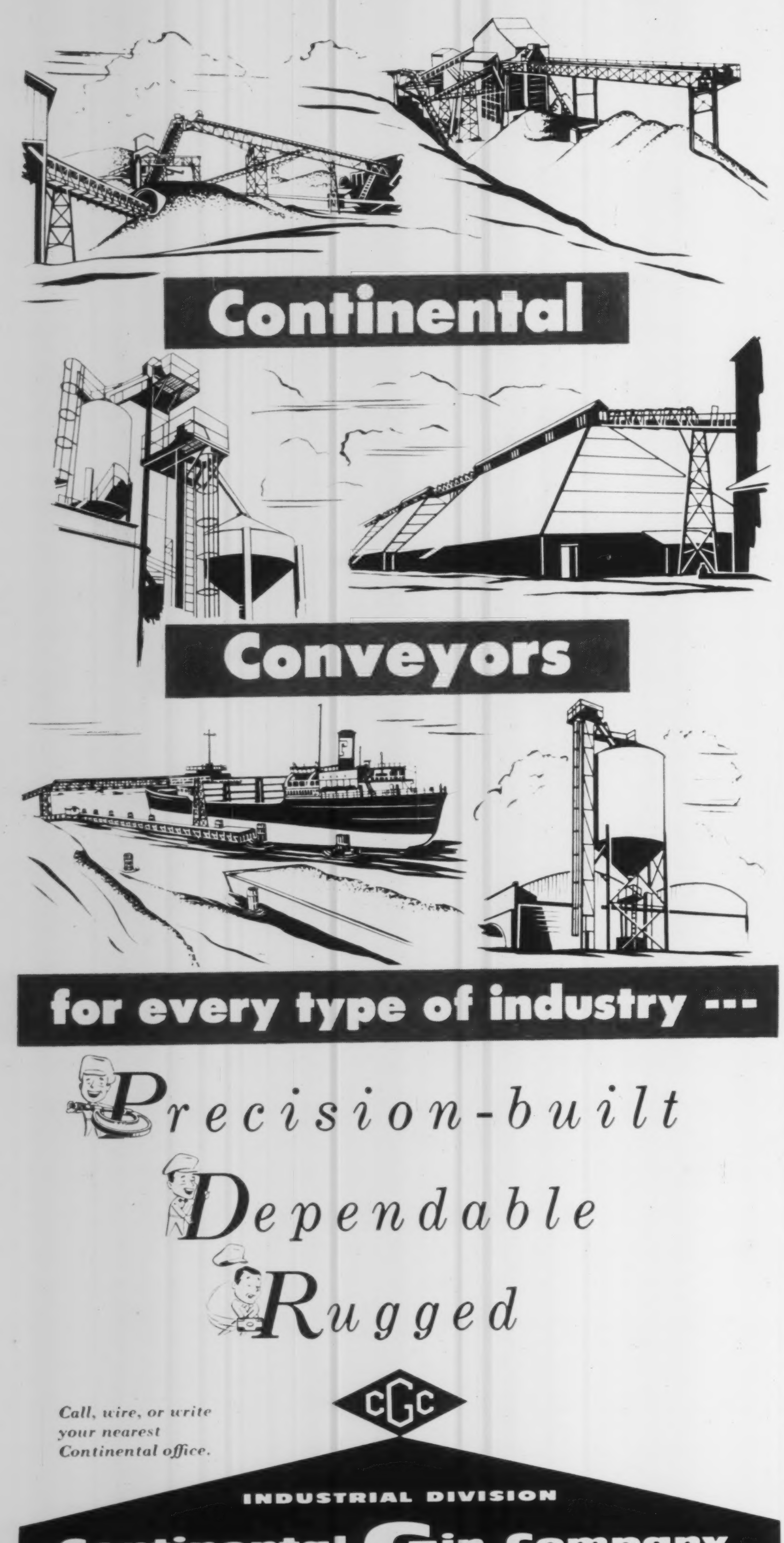

Call, wire, or write your nearest Continental office.

INDUSTRIAL DIVISION
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ROBERT C. HOOD
President, Ansul Chemical Co.,
Marinette, Wis.

protecting tremendous quantities of flammable substances. Experience shows that almost without realizing it, management continuously introduces new fire hazards. Fire protection can be designed to meet them from the wide selection of detecting, controlling, and extinguishing methods available.

Fire Extinguishing System Gives Low Cost Protection

—ROBERT C. HOOD

Many fire hazards in metal fabrication industries warrant fixed extinguisher protection which will flood the area at the instant a fire is discovered. Transformers, dip tanks, paint rooms, ovens, and oil-quenching operations all call for specialized protection.

The drawback of fixed or semifixed systems is the cost of the extinguishing mechanism which normally protects only one hazard. A dry chemical extinguishing system has been developed which will give mobile or fixed protection in a wide range of electrical and flammable liquid fires.

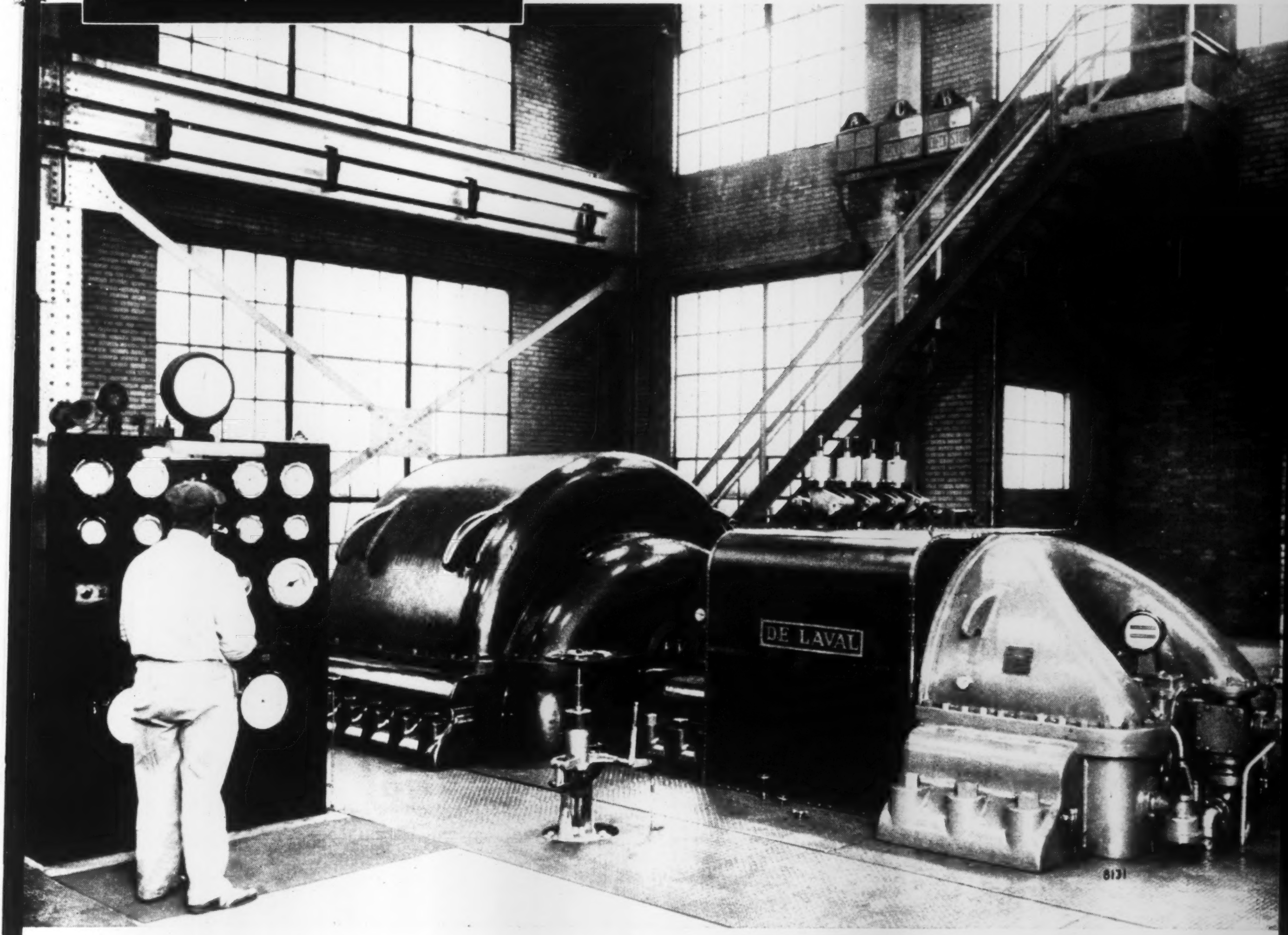
With the use of quick-coupling nozzle, mobile fire equipment can be connected to fixed piping and discharged in a matter of seconds to flood the fire area with dry chemical. A number of hazards can be protected with one extinguishing unit, if relatively low cost fixed piping is installed in each area. The extinguishing unit can also be used as manual fire fighting equipment with no change in the nozzle.

Holding down expenses, both in fire damage and fire protection, is becoming more and more important.

DE LAVAL

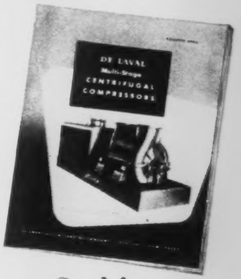
BLAST FURNACE BLOWERS

give 20 years of service at Great Lakes Steel Corp.



Shown is one of two De Laval centrifugal blast furnace blowers at the Ecorse, Michigan, plant of the Great Lakes Steel Corporation, Division of National Steel Corporation. This 85,000 cfm unit was installed twenty years ago; another 75,000 cfm unit went on the line a year earlier. Both have given dependable round-the-clock service ever since. These turbine-driven blowers are hooked up to a multi-head which enables either one to be used in conjunction with any of the three blast furnaces.

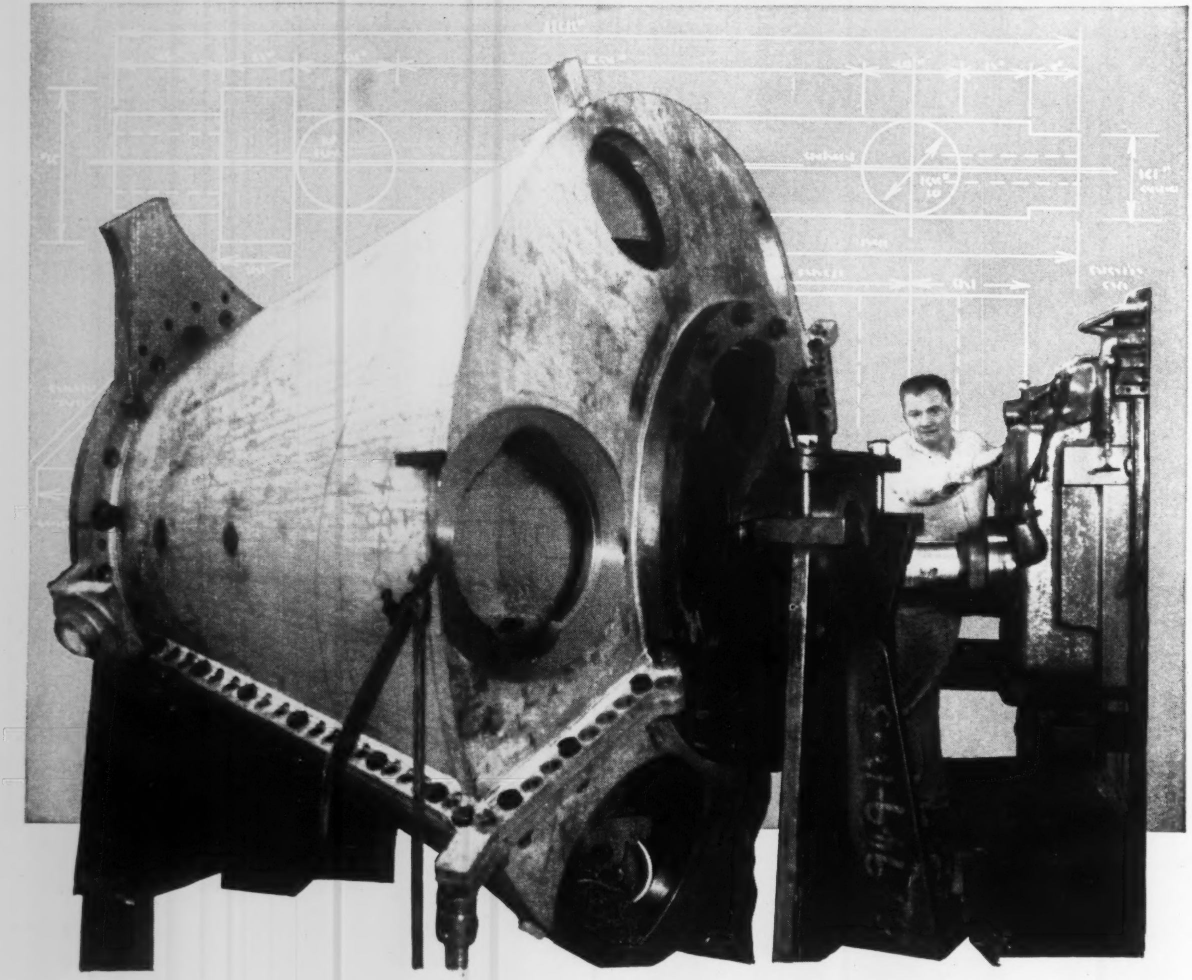
De Laval centrifugal blowers are built in single and multi-stage types to supply air in volumes up to 150,000 cfm for all classes of service in steel, gas and coke plants. The wealth of application experience acquired by De Laval over the years assures a correct and economical solution to your blower problem.



Send for Bulletin 0504

DE LAVAL *Centrifugal Blowers*

DE LAVAL STEAM TURBINE COMPANY
860 Nottingham Way, Trenton 2, New Jersey



"TAILORING" STEEL

Many machines and pieces of special equipment must be fitted to their individual jobs in modern industry with the precision that a custom tailor devotes to making a suit for an individual customer. Maintaining the skill, experience and modern equipment that can accomplish such "tailoring of steel" to special needs has always been a matter of policy and pride at Sun Ship.

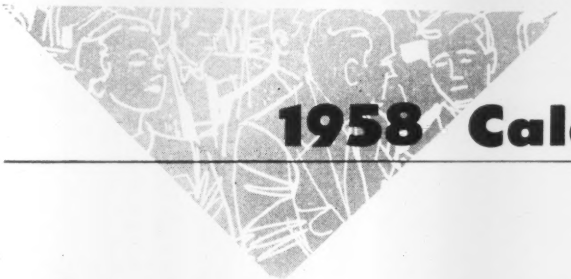
Machining special cylinders—as shown above—or drilling condenser tube sheets . . . boring a cylinder liner . . . making small parts . . . planning and building the special-purpose machinery that modern industry needs —such are typical jobs in the historic and versatile Wetherill plant, the machinery building unit of Sun Ship's integrated plant.

Since Sun Ship's foundation, in 1916, the spirit of keeping pace with progress in the various fields we serve has helped build our reputation for precision and reliability. On any problem of machinery production that you may face, you are invited to consult with our Sales Engineering Department.

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE (SINCE 1916) CHESTER, PA.



1958 Calendar of Meetings

Jan. 6-8, Southern Industrial Distributors' Association: Midyear meeting, Roosevelt Hotel, New Orleans. Association's address: 1626 Fulton National Bank Bldg., Atlanta 3, Ga. Secretary: E. L. Pugh.

Jan. 13-15, American Management Association: Special conference on developing new products, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. Secretary: Andrew P. Donovan.

Jan. 13-15, Compressed Air & Gas Institute: Annual meeting, Seacrest Manor, Hollywood, Fla. Institute's address: 122 E. 42nd St.; New York 17, N. Y. Secretary: Frank P. Anderson.

Jan. 13-17, Society of Automotive Engineers Inc.: Annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Jan. 16-17, National Industrial Conference Board Inc.: General session for all associates, Hotel Commodore, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Jan. 17, Malleable Founders' Society: Semiannual meeting, Cleveland Hotel, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Jan. 19-22, Institute of Scrap Iron & Steel Inc.: Annual meeting and show, Eden Roc, Fontainebleau and Deauville Hotels, Miami Beach, Fla. Institute's address: 1729 H St. N. W., Washington 6, D. C. Executive vice president: Edwin C. Barringer.

Jan. 20-23, American Road Builders Association: Annual meeting and exhibit, Sheraton-Park Hotel, Washington. Association's address: 600 World Center Bldg., Washington 6, D. C. Executive vice president: Louis W. Prentiss.

Jan. 20-22, Truck-Trailer Manufacturers Association: Annual convention, Palm Beach Biltmore Hotel, Palm Beach, Fla. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.

Jan. 21-22, Steel Shipping Containers Institute Inc.: Winter meeting, St. Regis Hotel, New York. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Jan. 26-30, Associated Equipment Distributors: Annual meeting, Conrad Hilton Hotel, Chicago. Association's address: 30 E. Cedar St., Chicago 11, Ill. Executive secretary: P. D. Herman.

Jan. 26-Feb. 2, Association of Steel Distributors Inc.: Convention, Algiers Hotel, Miami Beach, Fla. Association's address: 29 Broadway, New York 6, N. Y. Counsel: Morris Rosoff.

Jan. 27-28, Industrial Heating Equipment Association: Annual meeting, Penn Sheraton Hotel, Pittsburgh. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

Jan. 27-30, Plant Maintenance & Engineering Conference & Show: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 30-31, Steel Plate Fabricators Association: Annual meeting, Roosevelt Hotel, New Orleans. Association's address: 105 W. Madison St., Chicago 2, Ill. Secretary: J. Dwight Evans.

Feb. 3-7, American Institute of Electrical Engineers: Winter general meeting, Statler and Sheraton-McAlpin Hotels, New York. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Feb. 5-7, Alloy Casting Institute: Midwinter meeting, Ponte Vedra Club, Ponte Vedra Beach, Fla. Institute's address: 286 Old Country Rd., Mineola, N. Y. Executive vice president: E. A. Schoefer.

Feb. 5-8, National Tool & Die Manufacturers Association: Winter board meeting, Ambassador Hotel, Los Angeles. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

Feb. 6-7, Malleable Founders' Society: Technical and operation conference, Wade Park Manor, Cleveland. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Feb. 10-12, American Management Association: Marketing conference, Hotel Statler, New York. Assocation's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Feb. 10-14, American Society for Testing Materials: Committee Week, Statler Hotel, St. Louis. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

Feb. 11-13, Investment Casting Institute: Annual meeting, Roosevelt Hotel, New York. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: H. P. Dolan.

Feb. 16-20, American Institute of Mining, Metallurgical & Petroleum Engineers: Annual meeting, Statler and Sheraton-McAlpin Hotels, New York. Institute's address: 20 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

Feb. 17-19, American Management Association: Midwinter personnel conference, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Feb. 18-20, Caster & Floor Truck Manufacturers Association: Annual meeting, New Weston Hotel, New York. Association's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: H. P. Dolan.

Mar. 5-7, American Management Association: Special conference on employee benefits, Drake Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Mar. 9-11, American Machine Tool Distributors Association: Spring meeting, Roosevelt Hotel, New Orleans. Association's address: 1900 Arch St., Philadelphia 3, Pa. General Manager: James C. Kelley.

Mar. 11-13, Instrument Society of America, Pittsburgh Section: Annual conference on instrumentation of the iron and steel industry, Roosevelt Hotel, Pittsburgh. Secretary: Frank K. Briggs, Atomic Power Div., Westinghouse Electric Corp., Large, Pa.

Mar. 12-14, Pressed Metal Institute: Annual spring technical meeting, Sheraton-Cadillac Hotel, Detroit. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold Daschner.

Mar. 15-18, National Association of Waste Material Dealers: Annual meeting, Waldorf-Astoria Hotel, New York. Association's address: 2 E. 48th St., New York 17, N. Y. Managing director: Clinton M. White

Mar. 17-19, National Industrial Conference Board: Annual conference on atomic energy, Palmer House, Chicago. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

Mar. 17-20, American Society of Mechanical Engineers: Aviation division conference, Statler-Hilton Hotel, Dallas. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 17-21, National Association of Corrosion Engineers: Annual conference and exhibition, Civic Auditorium, San Francisco. Association's address: 1061 M & M Bldg., Houston 2, Tex. Executive secretary: A. B. Campbell.

Mar. 17-21, Nuclear Congress and Atomic Industry Trade Show: International Amphitheatre, Chicago. Information: International Atomic Exposition Inc., 12 S. 12th St., Philadelphia 7, Pa.

Mar. 17-18, Steel Founders' Society of America: Annual meeting, Drake Hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Mar. 19-21, American Management Association: Special conference on product development, LaSalle Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Mar. 19-21, Electronic Industries Association: Spring meeting, Statler Hotel, Washington. Association's address: 1721 Desales St., N. W., Washington 6, D. C. Secretary: James D. Secrest.

Mar. 25-28, Packaging Machinery Manufacturers Institute: Convention and show, Atlantic City Auditorium, Atlantic City, N. J. Institute's address: 60 E. 42nd St., New York 17, N.Y. Executive director: R. L. Sears.

Mar. 26-28, American Hot Dip Galvanizers Association: Annual meeting, Penn-Sheraton Hotel, Pittsburgh. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Mar. 31-Apr. 2, American Management Association: Special conference on purchasing, Palmer House, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Mar. 31-Apr. 2, Society of Automotive Engineers: National production meeting and forum, Drake Hotel, Chicago. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Apr. 2-4, American Management Association: Special conference on plant location, Roosevelt Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Apr. 7-8, Wire Reinforcement Institute Inc.: Annual meeting, Boca Raton Hotel, Boca Raton, Fla. Institute's address: National Press Bldg., Washington 4, D. C. Managing director: Frank B. Brown.

meeting, Hotel Cleveland, Cleveland. Association's address: 526 Washington Loan & Trust Bldg., Washington 4, D. C. Managing director: William Van C. Brandt.

Apr. 8, Material Handling Institute Inc.: Spring membership and directors meeting, Cleveland Hotel, Cleveland. Institute's address: 1 Gateway Center, Pittsburgh 22, Pa. Managing director: L. West Shea.

Apr. 8-10, Industrial Fasteners Institute: Annual meeting, Boca Raton Hotel, Boca Raton, Fla. Institute's address: 1517 Terminal Tower, Cleveland 13, Ohio. Secretary: James J. Whitsett.

Apr. 8-11, Society of Automotive Engineers: Aeronautic meeting and production forum and aircraft engineering display, Hotel Commodore, New York. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Apr. 9-10, Malleable Founders' Society: Market development conference, Edgewater Beach Hotel, Chicago. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

Apr. 13-18, American Chemical Society: Annual meeting, San Francisco. Society's address: 1155 16th St. N.W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Apr. 14-16, American Institute of Mining, Metallurgical & Petroleum Engineers: Open-hearth steel and blast furnace, coke oven, and raw materials conference, Statler Hotel, Cleveland. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

Apr. 14-16, American Management Association: Special west coast general management conference on small business, Ambassador Hotel, Los Angeles. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

Apr. 14-17, Design Engineering Show & Conference: International Amphitheatre, Chicago. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Apr. 14-18, American Welding Society: Welding show and technical meetings, Kiel Auditorium and Statler Hotel, St. Louis. Society's address: 33 W. 39th St., New York 18, N. Y. National secretary: Fred L. Plummer.

Apr. 14-18, Steel Shipping Containers Institute Inc.: Annual meeting, Kenilworth Hotel, Miami Beach, Fla. Institute's address: 600 Fifth Ave., New York 20, N. Y. Secretary: L. B. Miller.

Apr. 15-16, Lead Industries Association: Annual meeting, Chase-Park Plaza Hotel, St. Louis. Association's address: 60 E. 42nd St., New York 17, N. Y. Secretary: Robert L. Ziegfeld.

Apr. 17-18, American Institute of Steel Construction: National engineering conference, Chase-Park Plaza Hotel, St. Louis. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. Abbett Post.

Apr. 21-23, Association of Iron & Steel Engineers: Spring conference, Dinkler-Tutwiler Hotel, Birmingham. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 21-23, Building Research Institute: Annual meeting, Shoreham Hotel, Washington. Institute's address: 2101 Constitution Ave., Washington 25, D. C. Executive director: William H. Scheick.

Apr. 21-23, Metal Powder Association: Annual meeting and exhibit, Sheraton Hotel, Philadelphia. Association's address: 130 W. 42nd St., New York 36, New York. Secretary: Kempton H. Roll.

Apr. 21-23, Metal Treating Institute: Spring meeting, Camelback Inn, Phoenix, Ariz. Institute's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

Apr. 22-24, American Society of Lubrication Engineers: Annual meeting and exhibit, Hotel Cleveland, Cleveland. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: Calvert L. Willey.

Apr. 24-25, Society for Advancement of Management: Annual meeting, Statler Hotel, New York. Society's address: 74 Fifth Ave., New York 11, N. Y. Executive vice president: Harold R. Bixler.

Apr. 27-30, Chamber of Commerce of the U. S.: Annual meeting, Washington. Chamber's address: 1616 H St., Washington 6, D. C. Executive vice president: Arch N. Booth.

Apr. 27-May 1, Electrochemical Society Inc.: Spring meeting, Statler Hotel, New York. Society's address: 1860 Broadway, New York 23, N. Y. Secretary: Henry B. Linford.

Apr. 30-May 2, Grinding Wheel Institute and Abrasive Grain Association: Semiannual meeting, Grand Hotel, Point Clear, Ala. Managers: Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland 15, Ohio.

Apr. 30-May 3, National Screw Machine Products Association: Annual meeting, Drake Hotel, Chicago. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

May 1-8, American Society of Tool Engineers: Tool show and annual meeting Convention Center and Ben Franklin Hotel, Philadelphia. Society's address: 10700 Puritan Ave., Detroit 21, Mich. Executive secretary: Harry E. Conrad.

May 3-6, National Tool & Die Manufacturers Association: Spring board meeting, Statler Hotel, Washington. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

May 4-7, Liquefied Petroleum Gas Association Inc.: Annual meeting and exhibit, Conrad Hilton Hotel, Chicago. Association's address: 11 S. LaSalle St., Chicago 3, Ill. Secretary: Arthur C. Kreutzer.

May 5-6, American Institute of Mining, Metallurgical & Petroleum Engineers: Conference on properties of high-strength steels, Penn-Sheraton Hotel, Pittsburgh. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

May 5-7, American Management Association: Spring insurance conference, Statler Hotel, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

May 5-7, American Mining Congress: Annual coal convention, Netherland-Hilton Hotel, Cincinnati. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

May 5-7, Machinery Dealers National Association: Annual meeting, Eden Roc Hotel, Miami Beach, Fla. Association's address: 1346 Connecticut Ave. N. W., Washington 6, D. C. Secretary: R. K. Vinson.

May 8-9, Magnesium Association: Annual closed meeting, Grove Park Inn, Asheville, N. C. Association's address: 122 E. 42nd St., New York 17, N. Y. Secretary: Jerry Singleton.

May 8-9, National Association of Sheet Metal Distributors: Spring convention, Sheraton-Blackstone Hotel, Chicago. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

May 8-9, Refractories Institute: Annual meeting, Homestead, Hot Springs, Va. Intitute's address: 1801 First National Bank Bldg., Pittsburgh 22, Pa. Executive secretary: Avery C. Newton.

May 11-14, American Steel Warehouse Association: Annual meeting, Riveria Hotel, Las Vegas, Nev. Association's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive secretary: Robert G. Welch.

May 11-14, Copper & Brass Research Association: Annual meeting, Homestead, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Managing director: T. E. Veltfort.

May 11-14, National Association of Purchasing Agents: Annual meeting and exhibit, Conrad Hilton Hotel, Chicago. Association's address: 11 Park Place, New York 7, N. Y. Secretary: G. W. H. Ahl.

May 12-14, American Management Association: General management conference, Commodore Hotel, New York. Asociation's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

May 12-16, Southwestern Metal Congress & Exposition: Automobile Bldg., State Fair Park, Dallas. Sponsor: American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Managing director: William H. Eisenman.

May 13-15, Investment Casting Institute: Spring meeting, Edgewater Beach Hotel, Chicago. Institute's address: 27 E. Monroe St., Chicago 3, Ill. Executive secretary: H. P. Dolan.

May 14-16, Society for Experimental Stress Analysis: Spring meeting, Hotel Manger, Cleveland. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

May 15-16, American Management Association: Special marketing conference on sales forecasting, Drake Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

May 15-16, National Industrial Conference Board Inc.: General session for all associates and annual meeting, Waldorf-Astoria Hotel, New York. Board's address: 460 Park Ave., New York 22, N. Y. Secretary: Herbert S. Briggs.

May 18-22, American Society of Mechanical Engineers: Oil and gas power division conference, Bellevue Hotel, Philadelphia. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

May 18-21, Industrial Heating Equipment Association: Semiannual meeting, Homestead, Hot Springs, Va. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Robert E. Fleming.

May 19-22, American Electroplaters Society: Annual meeting, Sheraton-Gibson Hotel, Cincinnati. Society's address: 445 Broad St., Newark 2, N. J. Executive secretary: John P. Nichols.

May 19-23, American Foundrymen's Society: Annual castings congress and show, Public Auditorium, Cleveland. Society's address: Golf and Wolf Roads, Des Plaines, Ill. General manager: W. W. Maloney.

May 19-21, National Association of Metal Finishers: Annual meeting, Sheraton-Gibson Hotel, Cincinnati. Association's address: 60 Bentley Rd., Cedar Grove, N. J. Executive secretary: P. Peter Kovatis.

May 19-21, Nonferrous Founders Society: Annual meeting, Hotel Carter, Cleveland. Society's address: 1604 Chicago Ave., Evanston, Ill. Executive director: Herbert Scobie.

May 21-22, American Iron & Steel Institute: Annual meeting, Waldorf-Astoria Hotel, Institute's address: 150 E. 42nd St., New York 17, N. Y. Secretary: George S. Rose.

May 21-23, Electronic Industries Association: Annual meeting, Sheraton Hotel, Chicago. Association's address: 1721 DeSales St. N. W., Washington 6, D. C. Secretary: James D. Secrest.

May 26-28, American Management Association: Packaging conference and exposition, Statler Hotel and Coliseum, New York. Association's address: 1515 Broadway, New York 36, N. Y. President: Lawrence A. Appley.

May 26-28, American Society for Quality Control: Annual meeting, Statler Hotel, Boston. Society's address: 161 W. Wisconsin Ave., Milwaukee 3, Wis. Administrative secretary: W. P. Youngclaus Jr.

May 26-28, American Supply & Machinery Manufacturers' Association Inc.: Triple industrial supply convention, Waldorf-Astoria Hotel, New York. Information: Hunter-Thomas Associates, 2130 Keith Bldg., Cleveland 15, Ohio. Manager: W. B. Thomas.

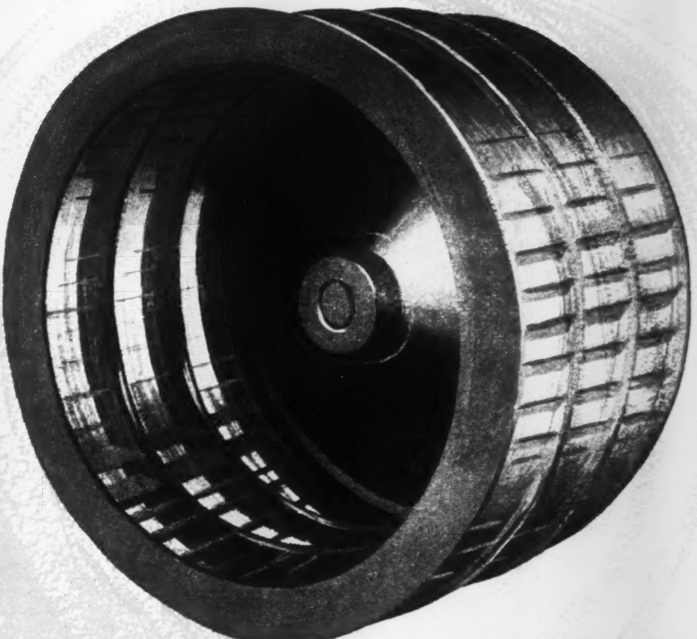
May 27-29, American Institute of Mining, Metallurgical & Petroleum Engineers: Reactive metals conference, Statler Hotel, Buffalo. Institute's address: 29 W. 29th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

June 1-4, American Gear Manufacturers Association: Annual meeting, Homestead, Hot Springs, Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. C. Sears.

June 2-5, National District Heating Association: Annual meeting and exhibit, French Lick Sheraton Hotel, French Lick Springs, Ind. Association's address: 827 N. Euclid Ave., Pittsburgh 6, Pa. Secretary-treasurer: John F. Collins Jr.

June 2-4, National Fluid Power Association: Annual meeting, Bedford Springs Hotel,

HAYNES Alloys solve the *tough* heat problems



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at 1600 to 1800 deg. F.

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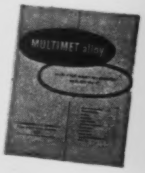
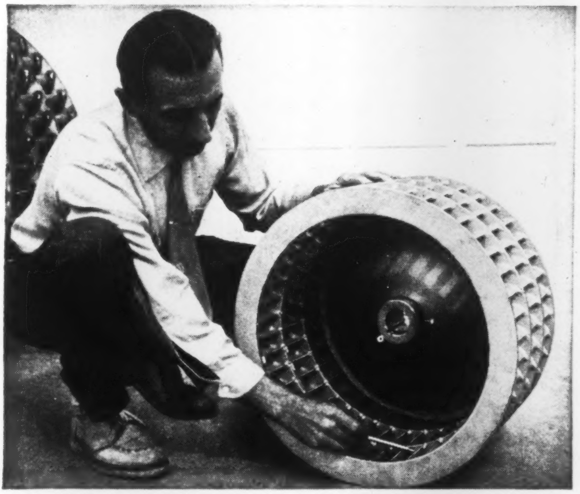
MULTIMET is one of 12 HAYNES alloys specifically designed for use where strength at high temperatures is essential. For details on properties, forms, and prices send for descriptive literature or contact our nearest sales office. HAYNES STELLITE COMPANY, Division of Union Carbide Corporation, General Offices and Works, Kokomo, Indiana. Sales Offices in Chicago, Cleveland, Detroit, Houston, Los Angeles, New York, San Francisco.





Designed to operate at 1800 deg. F., this impeller has 180 blades formed from MULTIMET alloy sheet. Impellers range from 12 to 48 inches in diameter. Furnace rotors, cast of MULTIMET alloy, operate at temperatures up to 2100 deg. F.

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Bedford, Pa. Association's address: 1618 Orrington Ave., Evanston, Ill. Executive secretary: Barrett Rogers.

June 3-6, National Industrial Advertisers Association: Annual conference, Chase-Park Plaza Hotel, St. Louis. Association's address: 271 Madison Ave., New York 16, N. Y. President: John C. Freeman.

June 4-5, Pressed Metal Institute: Personnel management meeting, Carter Hotel, Cleveland. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold Daschner.

June 8-13, Society of Automotive Engineers: Summer meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

June 9-13, International Automation Congress & Exposition: Coliseum, New York. Information: Richard Rimbach Associates Inc., 845 Ridge Ave., Pittsburgh 12, Pa.

June 9-10, Malleable Founders' Society: Annual meeting, Homestead, Hot Springs, Va. Society's address: 1800 Union Commerce Bldg., Cleveland 14, Ohio. Executive vice president: Lowell D. Ryan.

June 9-12, National Materials Handling Exposition & Conference: Public Auditorium, Cleveland. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

June 15-19, American Society of Mechanical Engineers: Semiannual meeting, Statler Hotel, Detroit. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

June 21-24, Alloy Casting Institute: Annual meeting, Homestead, Hot Springs, Va. Institute's address: 286 Old Country Rd., Mineola, N. Y. Executive vice president: E. A. Schoefer.

June 22-27, American Society for Testing Materials: Annual meeting and exhibit, Statler Hotel, Boston. Society's address: 1916 Race St., Philadelphia 3, Pa. Executive secretary: Robert J. Painter.

June 23-27, American Institute of Electrical Engineers: Summer general meeting, Hotel Statler, Buffalo. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

June 24-26, American Marketing Association: Annual meeting and exhibit, Harvard University, Boston. Association's address: 27 E. Monroe St., Chicago, Ill. Secretary: Schuyler F. Otteson.

July 14-16, Truck-Trailer Manufacturers Association: Summer meeting, Homestead, Hot Springs, Va. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John B. Hulse.

July 23-26, National Tool & Die Manufacturers Association: Summer board meeting, Mt. Washington Hotel, Bretton Woods, N. H. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

Aug. 19-22, Western Electronic Show & Convention: Pan Pacific Auditorium, Los Angeles. Information: WESCON, 342 North LaBrea Ave., Los Angeles 36, Calif.

Sept. 7-12, American Chemical Society: National chemical exposition and conference, International Amphitheatre, Chicago. Society's address: 1155 16th St. N. W., Washington 6, D. C. Executive secretary: Alden H. Emery.

Sept. 8-11, Society of Automotive Engineers: Farm, construction and industrial machinery meeting and production forum and engineering display, Milwaukee Auditorium, Milwaukee. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Sept. 10-11, American Die Casting Institute: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 366 Madison Ave., New York 17, N. Y. Secretary: David Laine.

Sept. 15-19, Instrument Society of America: Annual instrument automation conference and exhibit, Convention Hall, Philadelphia. Society's address: 313 Sixth St., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

Sept. 16-18, Electronic Industries Association: Fall meeting, St. Francis Hotel, San Francisco. Association's address: 1721 DeSales St. N. W., Washington 6, D. C. Secretary: James D. Secrest.

Sept. 22-25, American Mining Congress: Metal mining and industrial minerals convention and exposition, Civic Auditorium, San Francisco. Congress' address: 1102 Ring Bldg., Washington 6, D. C. Executive vice president: Julian D. Conover.

Sept. 22-23, Steel Founders' Society of America: Fall meeting, Homestead, Hot Springs, Va. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Sept. 23-26, Association of Iron & Steel Engineers: Convention and exposition, Public Auditorium, Cleveland. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Sept. 25-27, Porcelain Enamel Institute: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Institute's address: 1145 19th St. N. W., Washington 6, D. C. Managing director: John C. Oliver.

Sept. 28-Oct. 2, Pressed Metal Institute: Annual executives meeting, Cloister, Sea Island, Ga. Institute's address: 3673 Lee Rd., Cleveland 20, Ohio. Managing director: Harold Daschner.

Sept. 29-Oct. 3, American Society of Tool Engineers: Semiannual meeting and western tool show, Shrine Exposition Hall and Statler Hotel, Los Angeles. Society's address: 10700 Puritan Ave., Detroit 21, Mich. Executive secretary: Harry E. Conrad.

Sept. 29-Oct. 3, Society of Automotive Engineers: Aeronautic meeting and production forum and aircraft engineering display, Ambassador Hotel, Los Angeles. Society's address: 485 Lexington Ave., New York 17, N. Y. Secretary: John A. C. Warner.

Oct. 6-8, Truck Body & Equipment Association Inc.: Annual meeting and exhibit, Ambassador Hotel, Atlantic City, N. J. Association's address: 1616 K St. N. W., Washington 6, D. C. Executive manager: Arthur H. Nuesse.

Oct. 8-10, Gray Iron Founders Society Inc.: Annual meeting, Sheraton Park Hotel, Washington. Society's address: 930 National City-E. 6th Bldg., Cleveland 14, Ohio. Executive vice president: Donald H. Workman.

Oct. 13-15, National Electronics Conference Inc.: Annual meeting and exhibit, Sherman Hotel, Chicago. Conference's address: 84 E. Randolph St., Chicago 1, Ill. Executive secretary: John S. Powers.

Oct. 13-15, Packaging Institute: Annual meeting, Edgewater Beach Hotel, Chicago. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: Charles A. Feld.

Oct. 13-16, Wire Association: Annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J. Association's address: 453 Main St., Stamford, Conn. Executive secretary: Richard E. Brown.

Oct. 14-16, American Society of Mechanical Engineers and American Society of Lubrication Engineers: Joint lubrication conference, Statler Hotel, Los Angeles. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Oct. 14-16, Society of Industrial Packaging & Materials Handling Engineers: Annual meeting and industrial packaging and handling exposition, Chicago Coliseum, Congress and Morrison Hotels, Chicago. Information: Hanson & Shea Inc., 1 Gateway Center, Pittsburgh 22, Pa.

Oct. 15-17, American Machine Tool Distributors Association: Annual meeting, Sheraton Plaza Hotel, Boston. Association's address: 1900 Arch St., Philadelphia 3, Pa. General manager: James C. Kelley.

Oct. 16-18, Foundry Equipment Manufacturers Association Inc.: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Association's address: 1 Thomas Circle, Washington 5, D. C. Secretary: C. R. Heller.

Oct. 16-17, Magnesium Association: Fall meeting and exhibit, Fort Shelby Hotel, Detroit. Association's address: 122 E. 42nd St., New York 17, N. Y. Secretary: Jerry Singleton.

Oct. 17-19, Metal Treating Institute: Annual meeting, Sheraton Hotel, Philadelphia. Institute's address: 271 North Ave., New Rochelle, N. Y. Executive secretary: C. E. Herington.

Oct. 26-29, American Gear Manufacturers Association: Semiannual meeting, Edgewater Beach Hotel, Chicago. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: J. C. Sears.

Oct. 26-30, American Institute of Steel Construction: Annual meeting, Greenbrier, White Sulphur Springs, W. Va. Institute's address: 101 Park Ave., New York 17, N. Y. Executive vice president: L. A. Post.

Oct. 27-31, American Institute of Electrical Engineers: Fall general meeting, Pittsburgh. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 27-31, American Institute of Mining, Metallurgical & Petroleum Engineers: Institute of Metals Div.'s fall meeting, Carter Hotel, Cleveland. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

Oct. 27-31, National Metal Congress & Exposition: Public Auditorium, Cleveland. Sponsor: American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. Managing director: William H. Eisenman.

Oct. 27-31, American Society for Metals: Annual meeting, Statler Hotel, Cleveland. Society's address: 7301 Euclid Ave., Cleveland 3, Ohio. Managing director: William H. Eisenman.

Nov. 5-9, National Tool & Die Manufacturers Association: Annual convention, Sheraton Hotel, Philadelphia. Association's address: 907 Public Square Bldg., Cleveland 13, Ohio. Executive vice president: George S. Eaton.

Nov 5-7, Porcelain Enamel Institute: Shop practice forum, University of Illinois and Urbana Lincoln Hotel, Urbana, Ill. Institute's address: 1145 19th St. N. W., Washington 6, D. C. Managing director: John C. Oliver.

Nov. 10-13, National Electrical Manufacturers Association: Annual meeting, Traymore Hotel, Atlantic City, N. J. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Nov. 10-12, Steel Founders' Society of America: Technical and operating conference, Carter Hotel, Cleveland. Society's address: 606 Terminal Tower, Cleveland 13, Ohio. Executive vice president: F. Kermit Donaldson.

Nov. 12-14, Society for Experimental Stress Analysis: Annual meeting, Hotel Sheraton-Ten-Eyck, Albany, N. Y. Society's address: P. O. Box 168, Cambridge 39, Mass. Secretary-treasurer: W. M. Murray.

Nov. 17-21, Society of the Plastics Industry Inc.: National plastics exposition and conference, International Amphitheatre and Morrison Hotel, Chicago. Society's address: 250 Park Ave., New York 17, N. Y. Executive vice president: William T. Cruse.

Nov. 20-21, National Foundry Association: Annual meeting, Drake Hotel, Chicago. Association's address: 53 W. Jackson Blvd., Chicago 4, Ill. Executive secretary: Charles T. Sheehan.

Nov. 30-Dec. 5, American Society of Mechanical Engineers: Annual meeting, Statler and Sheraton McAlpin Hotels, New York. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Dec. 3-5, American Institute of Mining, Metallurgical & Petroleum Engineers: Electric furnace steel conference, Hotel Statler, Detroit. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: Ernest Kirkendall.

Dec. 8-10, American Nuclear Society: Winter meeting, Sheraton-Cadillac, Detroit. Society's address: P. O. Box 963, Oak Ridge, Tenn. Executive secretary: W. W. Grigorieff.

Dec. 10-11, Industrial Truck Association: Annual meeting, Roosevelt Hotel, New York. Association's address: 526 Washington Loan & Trust Bldg., Washington 4, D. C. Managing director: William Van C. Brandt.

Dec. 28-31, American Marketing Association: Winter meeting and exhibit, Morrison Hotel, Chicago. Association's address: 27 E. Monroe St., Chicago, Ill. Secretary: Schuyler F. Otteson.

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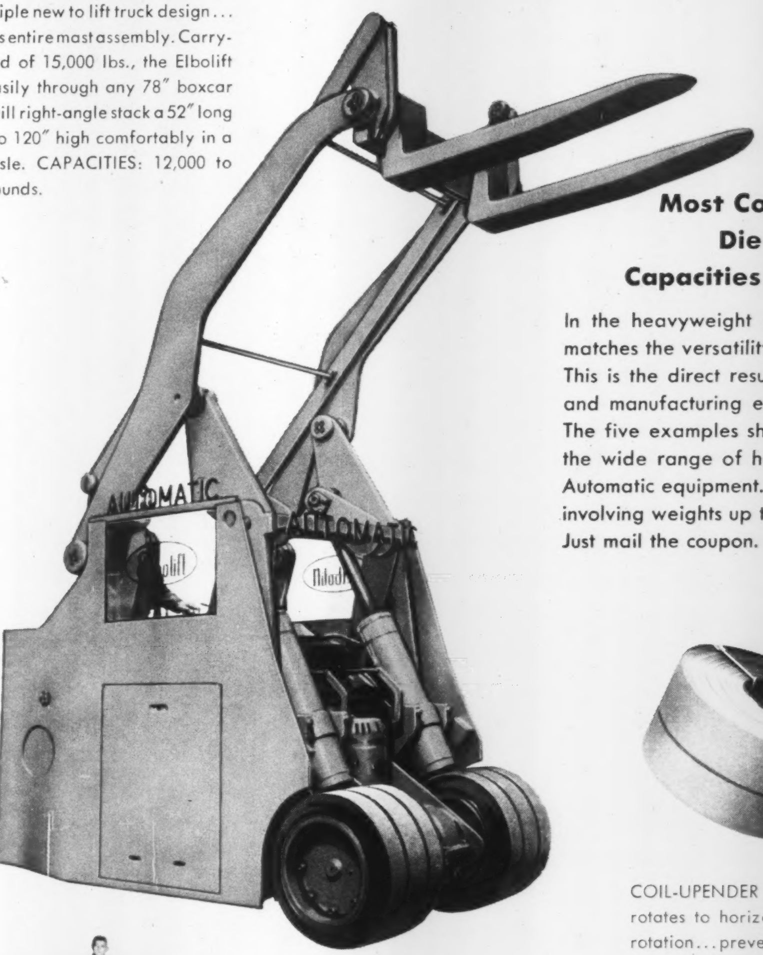
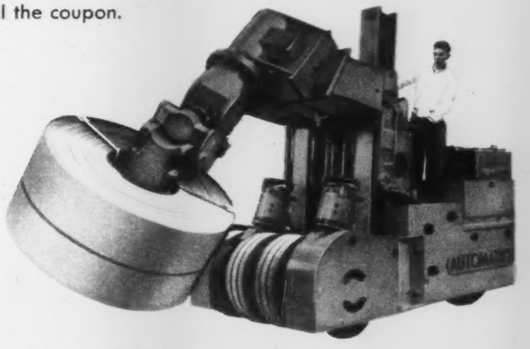
SERIES MF-ELBOLIFT: Works on leverage principle new to lift truck design... eliminates entire mast assembly. Carrying a load of 15,000 lbs., the Elbolift passes easily through any 78″ boxcar door... will right-angle stack a 52″ long load up to 120″ high comfortably in a 13′ 8″ aisle. CAPACITIES: 12,000 to 20,000 pounds.

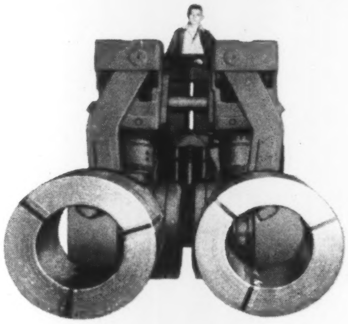


Automatic...
Most Complete Line of Steel and Die Handling Equipment
Capacities up to 110,000 lbs. or more

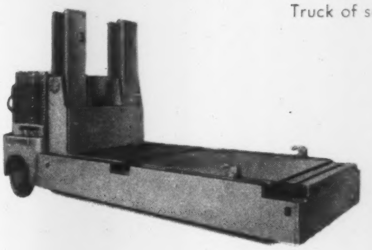
In the heavyweight division of materials handling, no other line matches the versatility and range of Automatic's heavy duty trucks. This is the direct result of many years of specialized engineering and manufacturing experience in the coil and die handling field. The five examples shown here comprise only a small sampling of the wide range of heavy duty handling requirements served by Automatic equipment. So don't hesitate to call us in on any problem involving weights up to any practical limit. No obligation, of course. Just mail the coupon.



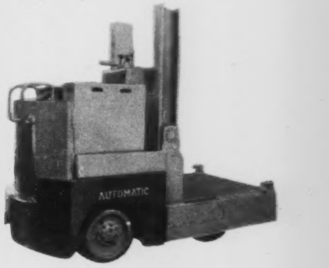
COIL-UPENDER ATTACHMENT: Picks up coil in vertical position and rotates to horizontal or vice versa. Holds coil securely throughout rotation... prevents telescoping. Handles up to 60,000 lbs. Now available on Automatic HR Series or as an attachment for any Automatic Truck of suitable design and capacity.



SKYLIFT GIANT: Heavy duty mast type truck available with either forks or ram. Model shown here has split ram to handle either 1 or 2 coils at a time. CAPACITIES: 20,000 through 80,000 pounds or more.



SERIES TLO: First heavy duty die handlers ever made with completely hydraulic loading, unloading and lift. Bullards move much faster and smoother than in any mechanical system... unloads at end or either side to meet any requirements of space and accessibility. CAPACITIES: 4,000 to 110,000 pounds or more.



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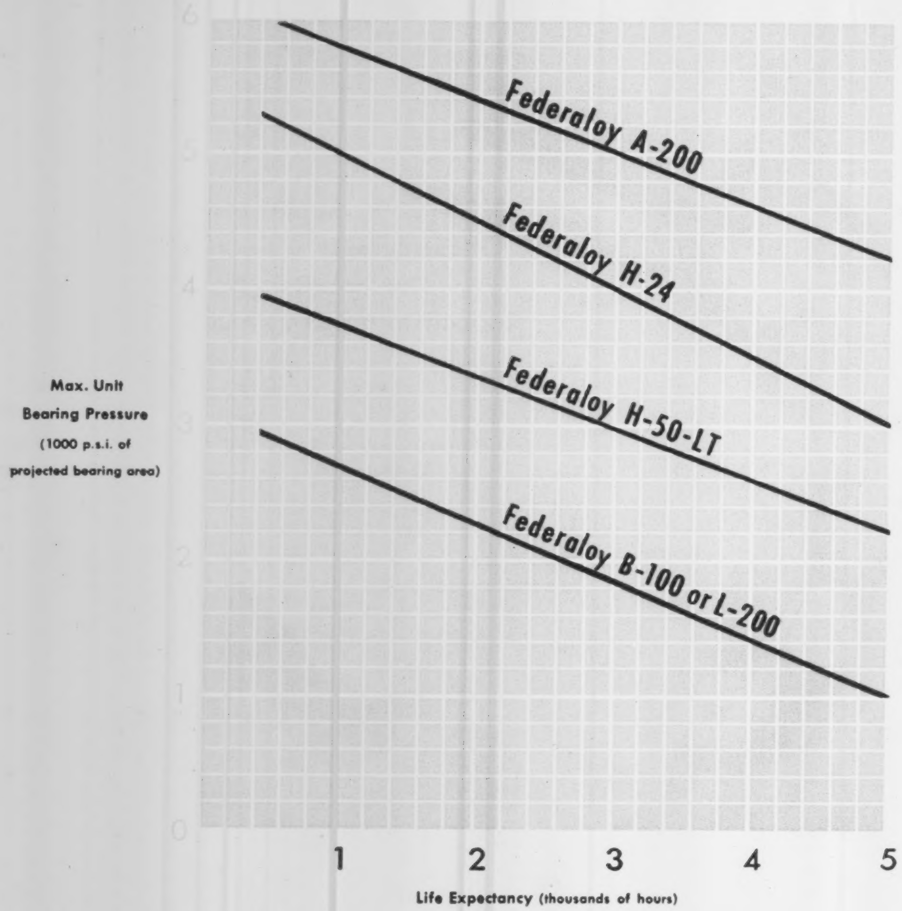

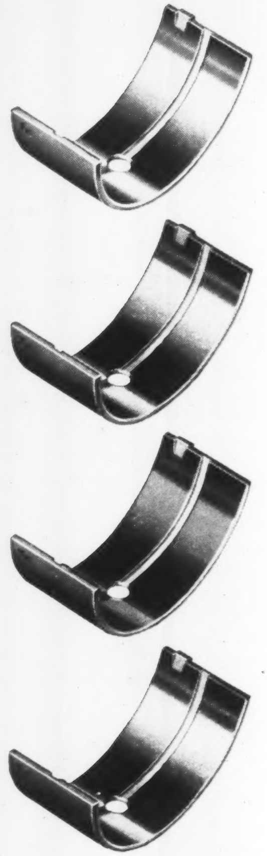

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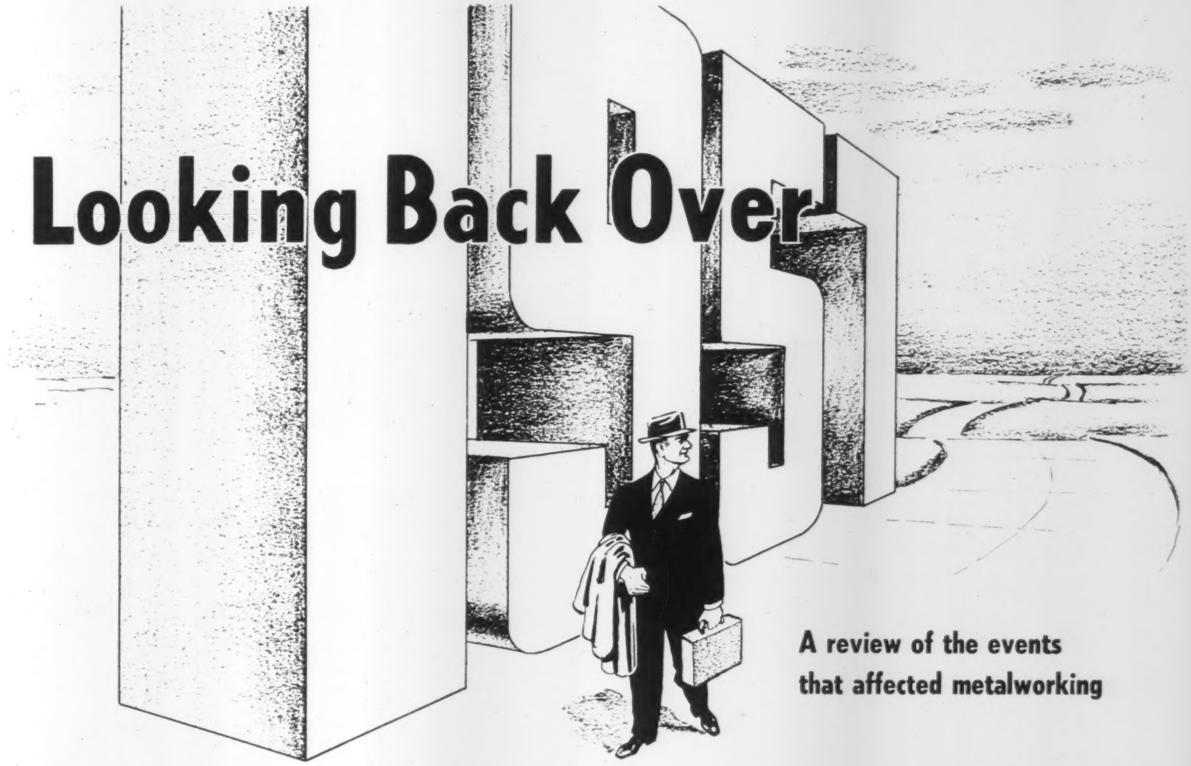
Looking Back Over



A review of the events that affected metalworking

January

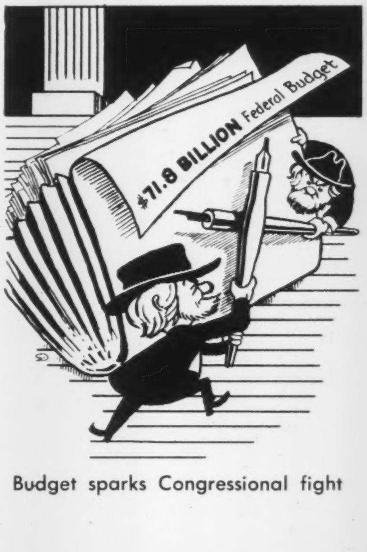
BEGINNING the year with an annual steelmaking capacity of 133,459,150 net tons, up 3.9 per cent from capacity in January, 1956, the nation's furnaces run full blast to catch up with demand.

During the week ended Jan. 13, they operate at 98.5 per cent of capacity and produce 2,517,000 net tons, just 7 tons short of the all-time high. Demand for plates is so strong that hot-rolled sheet lines are used to make light plates. Warehouse trouble spots are heavy plates, structurals, seamless and oil country pipes, and nickel-bearing grades of mill products.

Economists foresee the greatest year in history: Gross national product rising from $412.4 billion to $430 billion; auto assemblies increasing from 5.8 million to 6.8 million; construction moving up from $44.5 billion to $48 billion.

Steel may set a record in the first six months, says Roger M. Blough, chairman of U. S. Steel Corp. Second-half production will be lower, he adds, because of a slowdown in spending for capital goods. Charles R. Hook, Armco Steel Corp.'s chairman, predicts a record year for the industry.

President Eisenhower estimates it will cost $71.8 billion to run the government during the year beginnining July 1. His budget, second largest since World War II, appalls both parties. They vow wholesale reductions.



Budget sparks Congressional fight

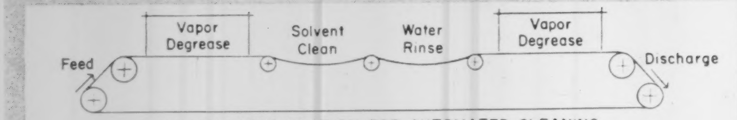
In his State of the Union message, the President calls on business and labor to help the government curb inflation. Business should "avoid unnecessary price increases." Labor's demands should be "reasonably related to improvements in productivity."

Iron and steel companies plan to spend $1.7 billion for new equipment and construction in 1957, reports the American Iron & Steel Institute. STEEL's survey shows that, despite government refusal to grant fast tax amortization, less than $100 million worth of projects will be cancelled.

General Motors Corp. puts the brakes on its program to increase automaking capacity, postponing construction of plants at Sunnyvale, Calif., and Lordstown, Ohio. Harlow Curtice, president, says the company's 1957 investment in tooling and facilities will be $1.25 billion, compared with $1.63 billion in 1956.

Chrysler plans to increase first-quarter auto production 26.6 per

Cambridge WOVEN WIRE BELTS



TYPICAL INSTALLATION FOR AUTOMATED CLEANING

Open mesh assures product uniformity in continuous processing

Cambridge Woven Wire Belts provide thorough, uniform degreasing or washing because cleaning solutions and vapors circulate freely *through* the open mesh of the belt to reach all parts of the product. In one continuous operation, parts can be carried through a degreasing, rinse, degreasing cycle to maintain capacity production. In heat treating, brazing, annealing and quenching operations too, Cambridge belts cut operating costs and increase production. Here's why:

CONTINUOUSLY MOVING BELT ELIMINATES BATCH PROCESSING for faster, more economical production.

ALL-METAL CONSTRUCTION RESISTS CORROSION, HEAT; takes temperatures up to 2100° F.; has no seams, lacers or fasteners to weaken or break.

OPEN MESH ALLOWS RAPID DRAINAGE of process solutions; assures thorough immersion of product.

SPECIAL CROSS FLIGHTS OR RAISED EDGES are available to hold product on belt during inclined movement.

Talk to your Cambridge FIELD ENGINEER soon — he'll explain the many advantages of continuous heat treating on Cambridge belts. And, he'll recommend the belt size, mesh or weave — in the metal or alloy — best suited to your operations. You'll find his name in the classified phone book under "BELTING, MECHANICAL". Or, write for FREE 130-PAGE REFERENCE MANUAL giving mesh specifications, design information and metallurgical data.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department A,
Cambridge 1,
Maryland

Cambridge CONVEYOR BELTS

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

cent over assemblies in the last three months of 1956. Sales of Ford cars exceed 120,000 for the month—a new record for January.

Trouble spots: Layoffs by General Electric Co. and Westinghouse Electric Corp. indicate that all's not well with TV and appliance sales. Slow copper buying continues. Machine tool builders cut overtime and predict further order declines. Strike at Linde Co., a division of Union Carbide Corp., threatens oxygen supplies.

On the international scene, oil shortage plagues Europe. President Eisenhower asks Congress for standby authority to use troops in the Mideast. For the second time in 21 years, France gives Germany the Saar.

February

EISENHOWER'S honeymoon ends as he starts second term in White House. Conservative Republicans complain about the appointment of "modern" GOP Chairman H. Meade Alcorn Jr.

Treasury Secretary George M. Humphrey warns that big federal budgets will produce "a depression that will curl your hair." Adds ex-President Herbert Hoover ruefully: "Mine has already been curled."

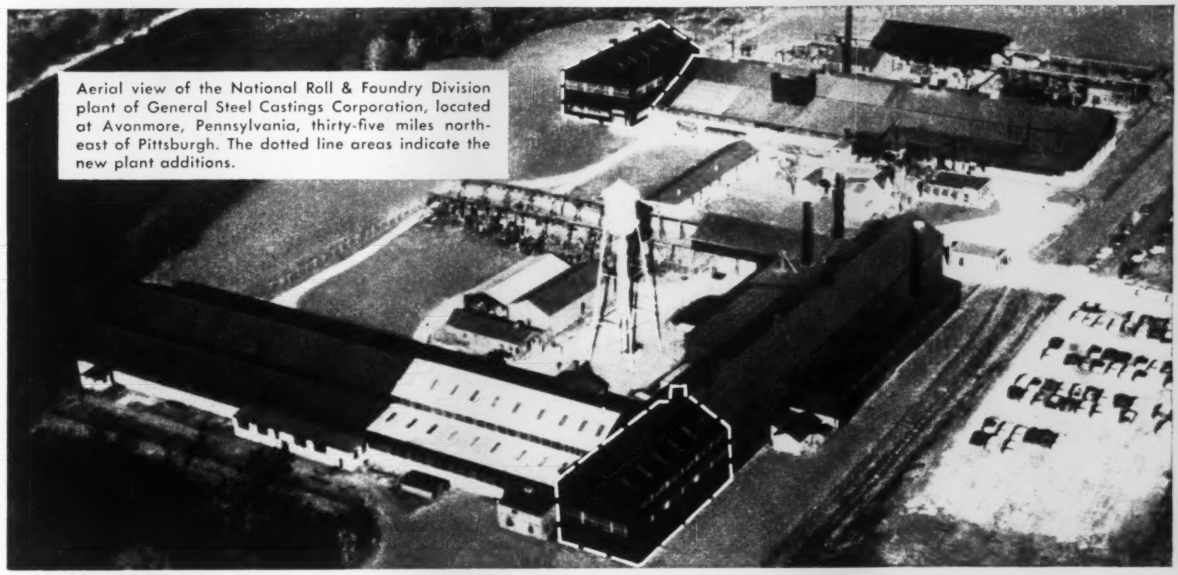
Labor Secretary James P. Mitchell asks Congress to extend the $1 an hour minimum wage to an additional 2.5 million workers, mostly in retail trade.

Appliance production cutbacks spread. Westinghouse lays off 665 of 5000 workers at Mansfield, Ohio, plant which makes laundry equipment, electric ranges, and portable appliances. GM's Frigidaire Div. announces it will furlough 1700 employees at Dayton, Ohio. GE discloses three reductions, also totaling 1700.

Despite layoffs, employment reaches 63.2 million—a new high for the month.

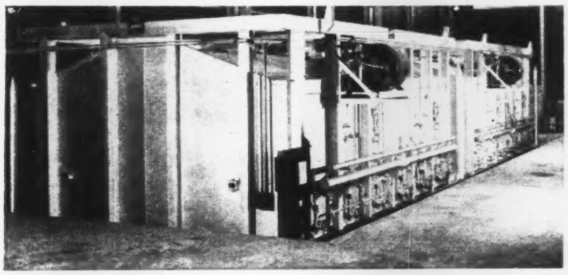
R. L. Gray, Armco Steel Corp. president, announces that his company will spend $50 million to expand its Ashland, Ky., and Houston plants. More ambitious plans were abandoned because of government denial of fast tax write-offs.

James H. Kindelberger, chairman, North American Aviation Inc., predicts a record year for



Aerial view of the National Roll & Foundry Division plant of General Steel Castings Corporation, located at Avonmore, Pennsylvania, thirty-five miles northeast of Pittsburgh. The dotted line areas indicate the new plant additions.

GENERAL STEEL CASTINGS EXPANDS NATIONAL ROLL & FOUNDRY FACILITIES



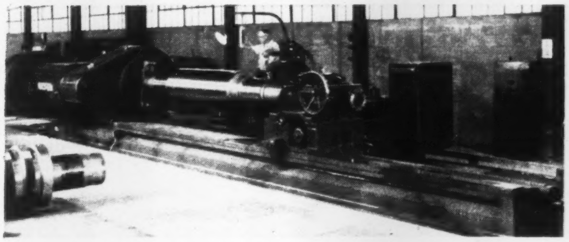
New annealing furnaces installed in the addition to the iron foundry. These furnaces are used in the heat treatment of alloy iron rolls.

To keep pace with the ever-growing steel industry, the National Roll Division's plant and equipment have been undergoing an expansion and modernization program that is nearing completion.

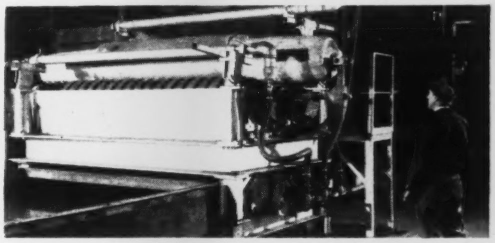
The photographs show four of these additions. There are many others: new pouring pits, furnaces, lathes and testing equipment, etc.

With these new facilities and National's almost half-a-century experience, we are prepared to furnish you the best in iron and steel rolls in a wide range of sizes and shapes for the most exacting rolling mill uses.

Specify National—you'll find they consistently live up to their reputation for long tonnage life, and quality of product.



A 60-inch precision-finish grinder, recently installed at National, is the "last word" in grinding equipment. This 60" grinder is one of the largest sizes manufactured for the roll industry.



Quenching machine designed and built by the National Roll & Foundry staff is used for rate control quenching of steel back-up rolls and steel work rolls.

NATIONAL ROLLS

GENERAL STEEL CASTINGS CORPORATION

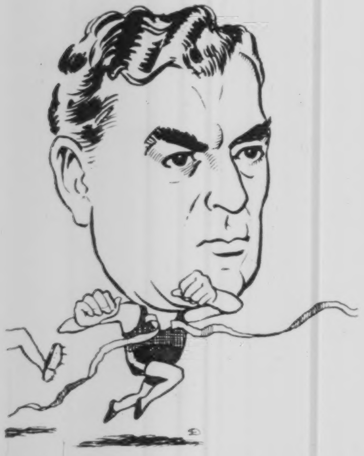
NATIONAL ROLL & FOUNDRY DIVISION

Avonmore (Westmoreland County) Pennsylvania

General Steel Castings Corporation: *General Offices, Granite City, Ill.* • ***Plants:*** *Granite City, Ill.—Eddystone, Pa.—Avonmore, Pa.*

his firm (1956 sales: $914 million).

David J. McDonald wins reelection as president of United Steelworkers of America despite opposition from Donald C. Rarick, a Pittsburgh district grievance committeeman. Observers interpret the vote (McDonald, 404,172; Rarick, 223,516) as anti-McDonald, rather than pro-Rarick.



McDonald beats Rarick to the tape

Chrysler Corp. reports its auto sales are 44 per cent ahead of January-February, 1956. Ford Motor Co. sales, up 22 per cent, set a record for the period. GM's sales are down 15 per cent.

National Association of Purchasing Agents says buyers are showing increasing resistance to rising prices, ordering on a hand-to-mouth basis.

Phelps-Dodge Corp. cuts the price of primary copper from 36 to 34 cents a pound for the first change at the producer level since Oct. 25, 1956, when the price dropped 4 cents.

International Harvester Co.'s February sales decline to $94 million from $115 million in February, 1956, reports Peter V. Moulder, president. Industry figures for January-February show that sales of construction equipment are 17 per cent below the 1956 level.

March

LAGGING DEMAND from automakers causes Great Lakes Steel Corp. to shut down three steelmaking furnaces. Sharon Steel Corp. takes two additional furnaces out of operation at Farrell, Pa.

Automakers cut back production because of lagging sales. In the first 20 days of the month, dealers retail 329,000 new cars, 8 per cent less than the same period a year earlier.

Commerce Department announces that business outlays for new plant and equipment are heading for a new high ($37.4 billion), 6.5 per cent above the 1956 level. Utilities plan a 28.2 per cent increase; railroads, 19.3 per cent; manufacturers, 9.8 per cent. Automakers will cut spending 25 per cent.

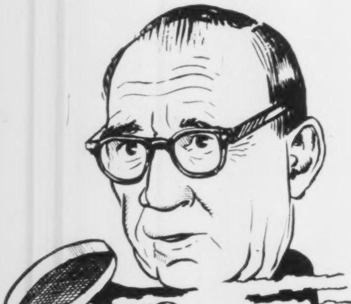
In the week ended Mar. 7, commercial and industrial failures climb to 327, highest since the week ended Apr. 10, 1940.

Housing starts drop to an annual rate of 880,000 units, lowest since February, 1949. Total construction awards set a record for the month ($3.1 billion), principally because of big investments in heavy engineering projects.

Money conditions show no signs of easing, William McC. Martin Jr., Federal Reserve Board chairman, tells Congress. He argues that proposals to pump more federal funds into housing would be inflationary.

Federal grand jury indicts James Hoffa, Teamsters' No. 2 official, for his attempt to bribe a lawyer employed by a Senate investigating committee. Indicted on charges of contempt of Congress are Frank W. Brewster, chairman of the Western Teamsters Conference, and Einer O. Mohn, an international vice president.

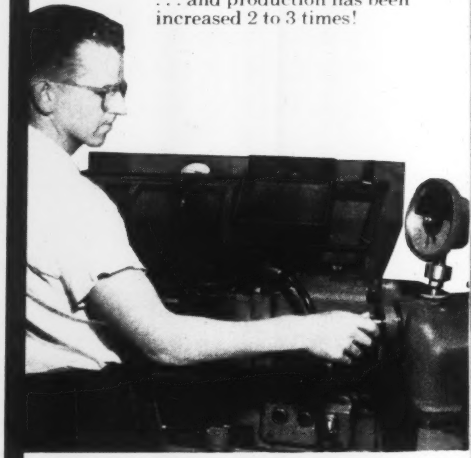
In the Senate hearings, checks,



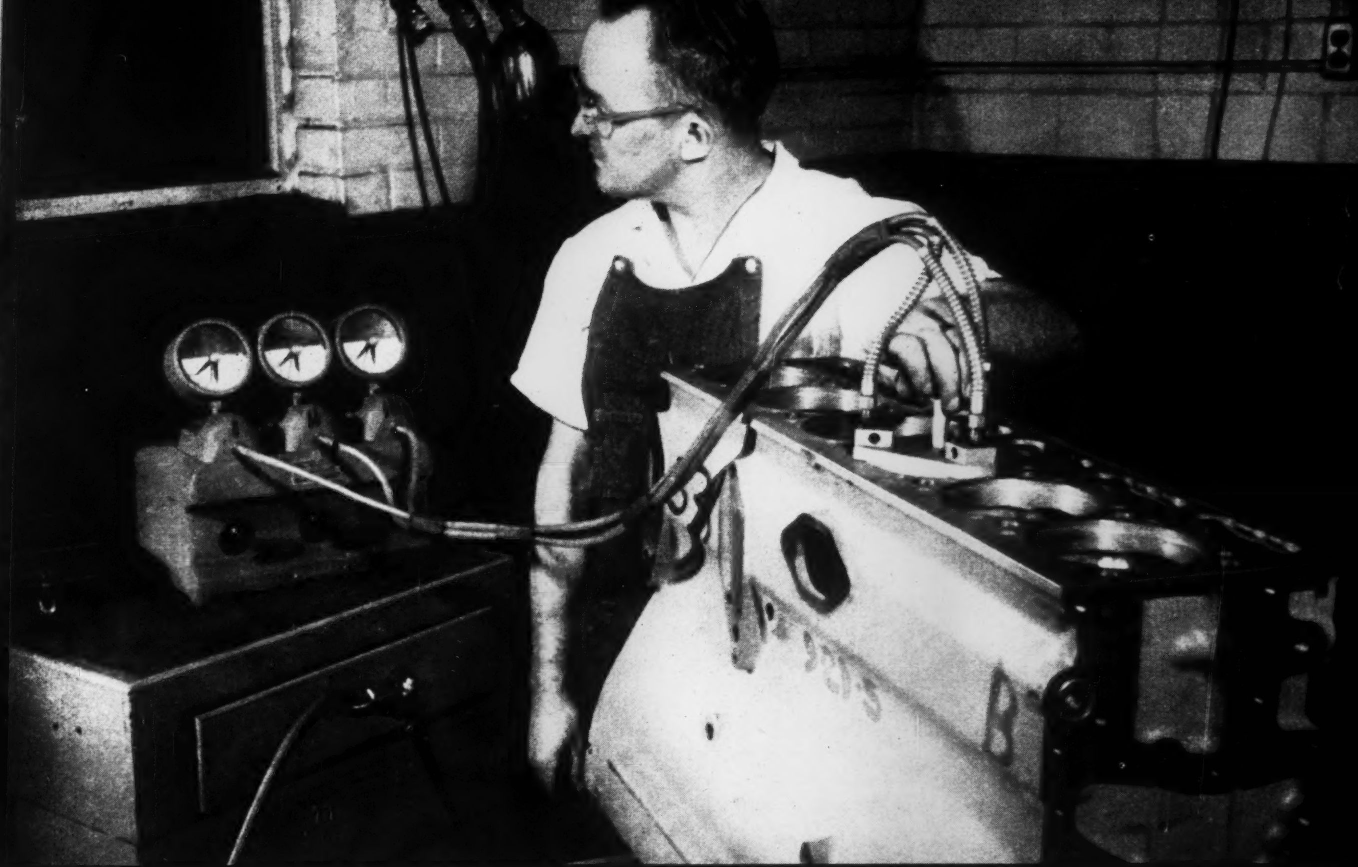
McClellan exposes Teamsters mess

OTHER P&W GAGE APPLICATIONS AT CUMMINS:

SIMULTANEOUSLY CHECKING 8 CRITICAL DIMENSIONS . . . of cylinder liners, this P&W Sigmatic Multi-Dimension Gaging Machine lets 1 man handle inspections formerly requiring 2 men . . . and production has been increased 2 to 3 times!



TEN-THOUSANDTHS PRECISION AT THE MACHINE . . . puts accuracy to work where it counts — right on the Cummins production line. Checking precision injector cups with this conveniently located P&W Air-O-Limit Comparator, the machine operator can be *sure* at a glance that his work is within tolerance.

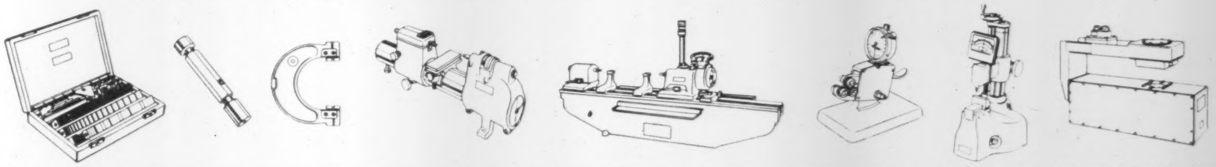


CUMMINS CUTS INSPECTION TIME 33%...

. . . and Pratt & Whitney Gages can bring *you* similar savings! One of the world's largest manufacturers of high-speed diesels the Cummins Engine Company believes that finer precision is a matter of increased production and greater profits. Gaging the depth of cylinder liner counterbores in cylinder blocks, Cummins was using a mechanical depth gage . . . checking at 2 points in each bore. To improve speed and precision on this vital inspection, Cummins switched to a P&W 3-Station Air-O-Limit Comparator. Inserted into the bore, the gage head checks depth at 3 points simultaneously . . . and a twist of the wrist provides readings around the entire circumference. Gaging time has been cut 33% with inspection costs correspondingly reduced. More accurate readings are obtained. And the full 360° inspection provides an extra assurance of product precision.

Because precision is important at Cummins, there are dozens of P&W Gages of every type in this plant. As their gage foreman states, "We like their accuracy and dependability – and the excellent service provided by the Pratt & Whitney Company."

You too can put greater precision to work to cut costs and increase production. Write now for more complete information on Pratt & Whitney Gages. Pratt & Whitney Company Inc., 13 Charter Oak Blvd., West Hartford, Conn.



GAGE BLOCKS . . . CONVENTIONAL GAGES . . . SUPERMICROMETERS . . . STANDARD MEASURING MACHINES . . . COMPARATORS . . . AUTOMATION AND CONTINUOUS GAGES

PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

affidavits, and expense vouchers are produced to show that Mr. Brewster used union money for: A down payment on a house ($4000); boxes at six California race tracks ($2670); expenses of his jockey and horse trainers ($2000).

Sen. John L. McClellan (D., Ark.), Labor Rackets Committee chairman, charges Teamsters' President Dave Beck with "flagrant disregard for honest unionism" and "arrogant contempt of honest laboring people."

President Eisenhower's aides butt heads over how to help the minerals industry. Fights focus on proposals for import curbs and tariff relief. Direct subsidies and stockpile buying appear out of the question.

Stockholders of Rotary Electric Steel Co. approve transfer of its stock and property to Jones & Laughlin Steel Corp. on the basis of four shares of J&L common for every five shares of Rotary.

April

FIRST QUARTER reports show that major steel and automotive companies are setting sales and profit records.

U. S. Steel Corp.'s sales ($1.17 billion) are the highest ever for a first quarter, and earnings ($115 million) are the highest for any quarter. Republic Steel Corp. reports the highest first quarter sales and earnings in its history.

Dollar volume of Chrysler Corp.'s sales ($1.15 billion) surpasses that of any previous quarter. Net of $46.5 million is almost four times greater than that of the first three months of 1956. Ford Motor Co.'s first quarter sales rise 30.5 per cent, and net increases 36 per cent. Dollar volume ($1.57 billion) is a record for any three-month period.

In some instances, rising costs dissipate profits. Union Carbide Corp.'s earnings dip from $1.24 a share to $1.20, despite a 9 per cent sales increase. Profits of Borg-Warner Corp. fall nearly 8 per cent, even though sales are slightly better than in the January-March quarter of 1956. Reasons: Higher costs of goods sold; administrative and selling expenses; product development costs.

Mills operate at 94.7 per cent of capacity during the first quarter and produce 31.6 million tons of steel for ingots and castings.

First quarter profits soar

President Eisenhower cuts his request for new appropriations for fiscal 1958 by almost $1.9 billion, but points out that actual spending won't be much reduced unless Congress revises some programs now required by law.

In cutting $218 million out of the Commerce Department's appropriations bill, the House deprives the Business & Defense Services Administration of $3.6 million and threatens its existence. Elimination of BDSA would seriously handicap the trigger and elephant tool program, warns an Office of Defense Mobilization spokesman.

Europe's tiny autos face a big test as more makers invade the U. S. GM's Harlow Curtice is skeptical, calls their performance "substandard." Studebaker - Packard Corp. announces it will sell Mercedes-Benz autos and bring out its own line of "economy" cars.

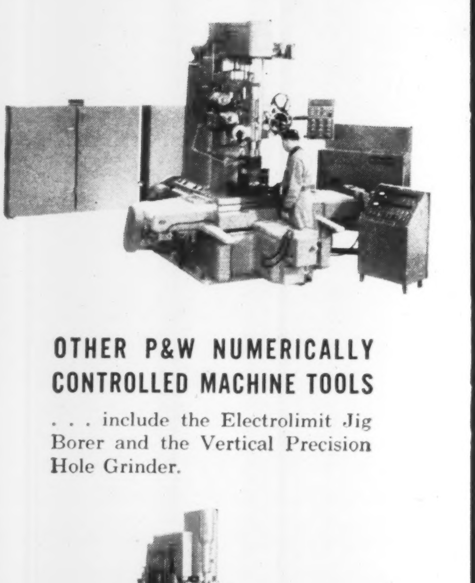
Walter Reuther is re-elected president of the United Auto Workers by acclamation. A potential rival, Carl Stellato, president of Ford's Rouge Local 600, decides not to run.

The Suez Canal is formally reopened to ships up to 20,000 tons.

May

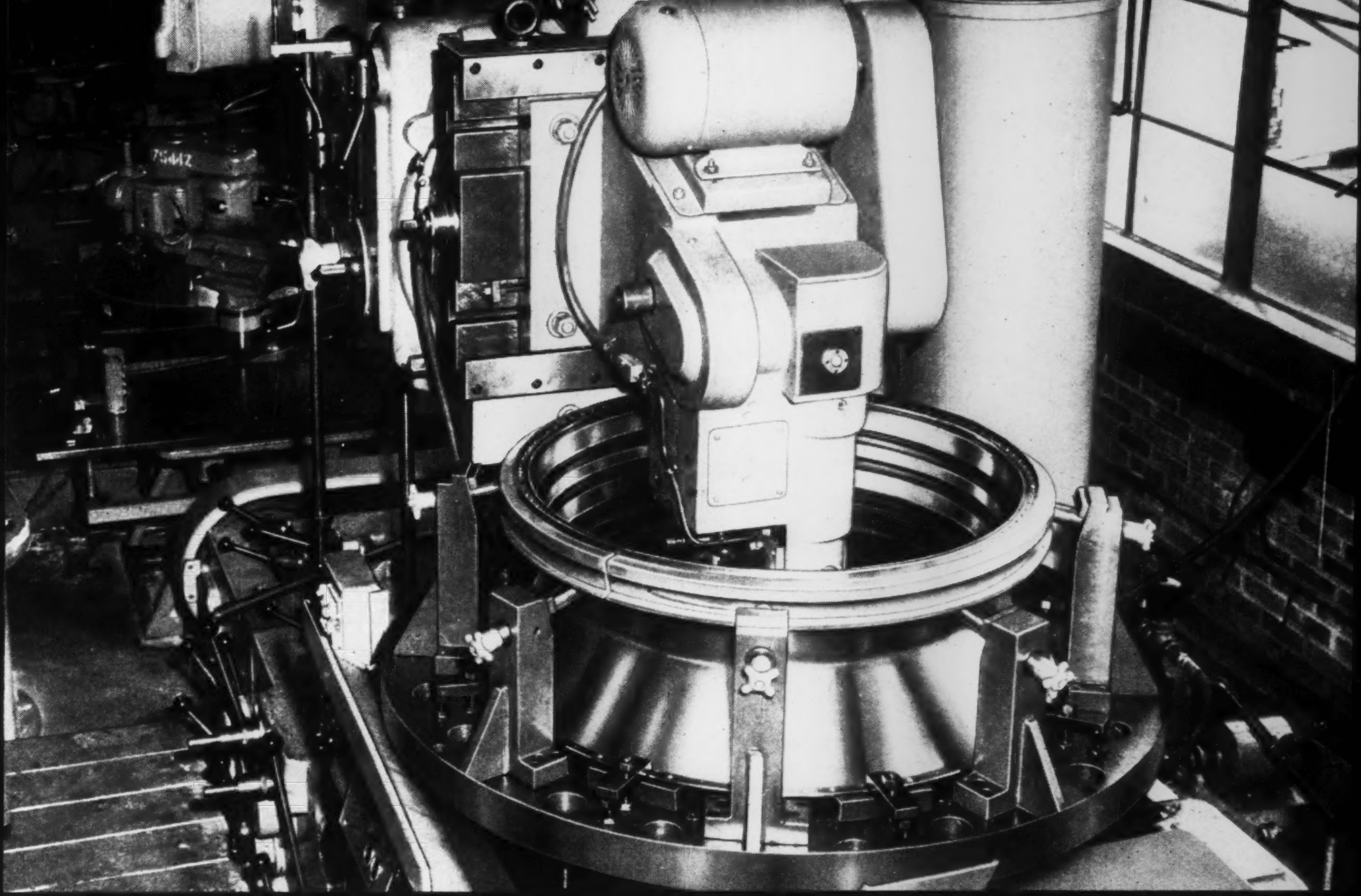
STEEL PRODUCTION estimates for 1957 are trimmed as incoming orders continue to drag. Steelmen now feel the year's output will approximate last year's 115 million tons.

Bethlehem Steel Corp. shuts



OTHER P&W NUMERICALLY CONTROLLED MACHINE TOOLS

. . . include the Electrolimit Jig Borer and the Vertical Precision Hole Grinder.



NO MISTAKES with NUMERICAL CONTROL

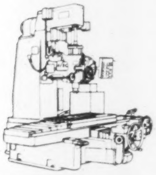
. . . and Machine Time Cut 46%!

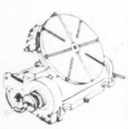
These were the results when a Pratt & Whitney Numerically Controlled Rotary Table was put to work by Lycoming Division of AVCO Manufacturing Corporation. This job involves milling 236 slots accurately located on three rings within jet engine cases. Directed by a punched tape, the new table automatically indexes the work for each cut. Indexing is accurate to 5 seconds of arc. In addition, the table's numerical control system governs the milling feed motions . . . putting the entire operation on an automatic cycle.

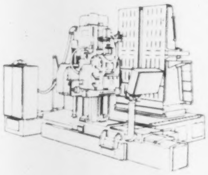
Replacing a hand-indexing rotary table, the P&W Numerically Controlled Rotary Table has cut machining time 46%! Equally important, P&W Numerical Control eliminates operator error in locating the 236 slots . . . which would turn a nearly completed workpiece into scrap.

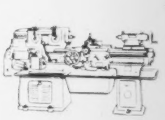
Lycoming's experience is no isolated example. Applied to P&W Rotary Tables, Jig Borers and other machines, Pratt & Whitney Numerical Control is producing equally spectacular time-and-money savings in many other plants. It may well offer opportunities for greater profits in *your* plant.

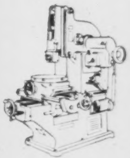
Write now for complete information. Pratt & Whitney Company, Incorporated, 13 Charter Oak Boulevard, West Hartford, Connecticut.











JIG BORERS . . . ROTARY TABLES . . . KELLER MACHINES . . . LATHES . . . VERTICAL SHAPERS . . . CUTTER AND RADIUS GRINDERS

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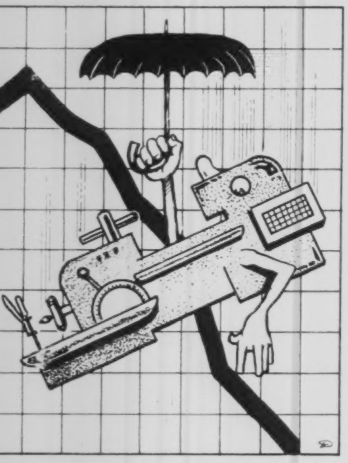


Machine tool orders plummet

down three more open-hearth furnaces at Lackawanna, N. Y., because of reduced demand for sheets.

Industrial and financial leaders describe business conditions as "spotty" at a Hot Springs, Va., conference of Commerce Secretary Sinclair Weeks' Business Advisory Council.

Mr. Weeks tells Congress voluntary agreements to reduce steel scrap exports might replace shipment limits and avoid the need for permanent quotas.

Nonferrous metal markets continue soft. Lead is reduced 0.5 cent to 15.5 cents, the first price change since Jan. 13, 1956. Zinc is cut from 13.5 to 12 cents. Defense Mobilizer Gordon Gray says the U. S. will continue to stockpile lead and zinc "for a while."

General Motors declines a UAW invitation to participate in a study of the best way to put a shorter workweek into effect.

Harlow Curtice revises his forecast of 1957 auto sales from 6.5 million to 5.8 million.

Benjamin F. Fairless, American Iron & Steel Institute president, says U. S. steel production capacity may show a greater gain this year than in 1956, when 5 million tons were added. Long term steel requirements necessitate annual increases of at least 3 million tons, he believes.

Machine tool builders report only $41.4 million in new orders, smallest bookings since November, 1954.

At Louisville, GE furloughs 1000 workers indefinitely, because of a 10 per cent slump in sales of refrigerators. Frigidaire lays off 2200, explaining that a cutback is necessary to "balance product inventories with demand."

U. S. Court of Appeals upholds the legality of Teamsters' "hot cargo" contract clauses.

Federal grand jury indicts Dave Beck on two counts of income tax evasion. AFL-CIO's executive council ousts him as a vice president.

Sen. Joseph McCarthy (R., Wis.) dies of acute hepatitis at 47.

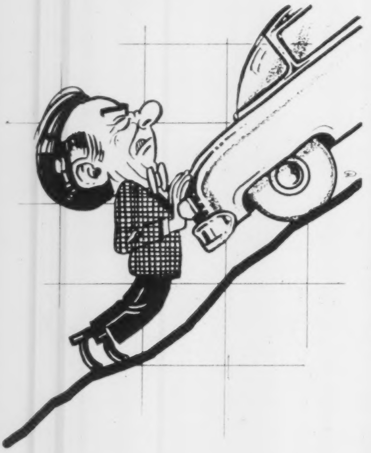
June

DISTURBED by the prospect that defense spending for fiscal 1957 will exceed the $36 billion allotted by Congress, Defense Secretary Wilson orders a $500-million cutback in June expenditures. He also forbids installment buying: No procurement orders may be placed unless enough spending authority has been provided to pay for the entire order.

With auto assemblies running 4 per cent ahead of the 1956 pace and sales 4 per cent behind, car manufacturers adjust their production schedules to dealer inventories. GM lays off 400 workers at Kansas City, Kans., and Midland Steel Products Co., a GM supplier, lays off the same number at Cleveland because of fewer orders for Buick frames.

The House approves a bill which would make the Small Business Administration a permanent agency, with lending authority increased by $270 million.

The Justice Department asks the U. S. District Court of New York



Auto sales lose momentum

Let me show you*

**James C. Browning, P&J Representative in the Ohio area.*

how changing to a P&J Automatic helped DeVilbiss . . .

JOB FACTS:

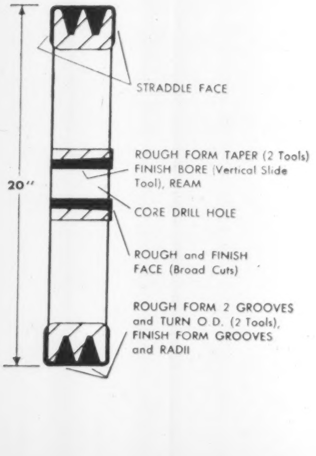
PART: *Air Compressor Flywheel*

MATERIAL: *Cast Iron*

REQUIRED: *5 turning, boring, facing, grooving and reaming operations*

THE MACHINE: *A P&J 6DRE-40 Automatic Turret Lathe*

THE RESULTS: *22 pieces completed every 4-hour shift . . . with the operator also handling 2 other secondary operations*



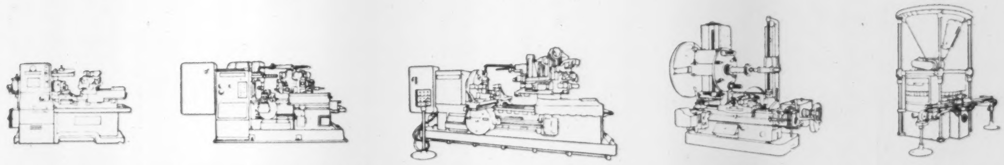
STRADDLE FACE
ROUGH FORM TAPER (2 Tools)
FINISH BORE (Vertical Slide Tool), REAM
20"
CORE DRILL HOLE
ROUGH and FINISH FACE (Broad Cuts)
ROUGH FORM 2 GROOVES and TURN O.D. (2 Tools), FINISH FORM GROOVES and RADII

JOHNSTON
E-40

. . . SAVE 66% IN LABOR COSTS through "JOB INTEGRATION"

The Potter & Johnston 6DRE-40 Automatic Turret Lathe recently installed at the Toledo, Ohio plant of the DeVilbiss Company machines large, high-precision flywheels – handling 5 complex cuts on a fully automatic basis. Previously, using a hand-type lathe, this same job required 5 separate hand operations and the operator's full-time attention. Now, with the P&J *Automatic* on the job, the operator also handles two secondary operations . . . keyway broaching and balancing . . . that formerly required 2 additional operators working in separate departments. As a result of this new "job integration," labor costs have been reduced 66% with 2 men released for other work, overall time for flywheel production has been reduced 20 to 30%, and costly time-wasting intra-plant handling has been eliminated.

If your manufacturing operations demand high-speed, economical production of precision parts, a switch to P&J Automatics can help reduce machining time and costs . . . and may also make it possible to streamline a whole series of related operations. Act today. Let us send the P&J Representative in your area to analyze your requirements and recommend a production plan to meet your needs. Write direct to Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES . . . GEAR CUTTERS . . . PACKAGING MACHINES

P&J

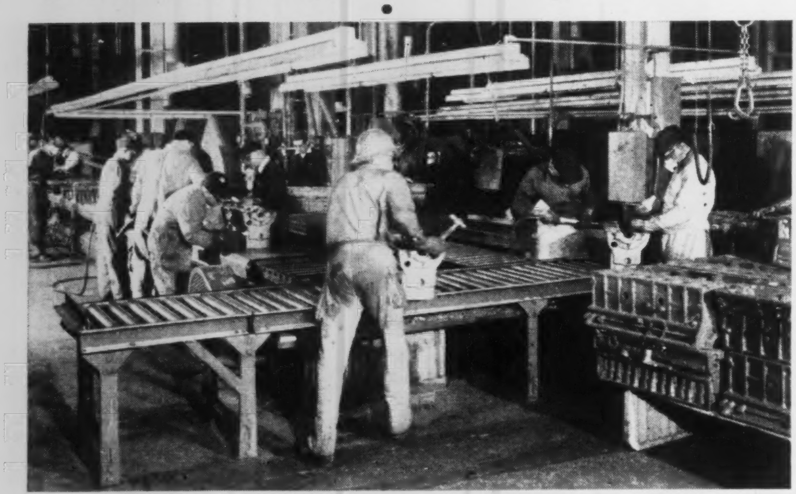
POTTER & JOHNSTON

SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.

PRECISION PRODUCTION TOOLING SINCE 1898

Ask Standard

how to cut costs with conveyors



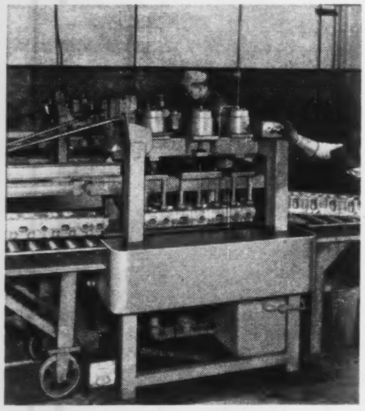
Cylinder blocks are chipped, ground and inspected on Standard Roller Conveyor line.

Eastern foundry simplifies cylinder block handling with roller conveyors

HERE'S another installation in which Standard Roller Conveyors are keeping heavy, bulky components flowing to machining and assembly points with minimum manpower and practically no time loss.

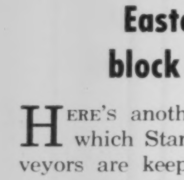
Easy to set up and exceptionally sturdy, Standard Roller Conveyors (live or gravity) can also be job-tailored to your specific materials handling problem — permanent or temporary.

And roller conveyors are only one of the many types of Standard conveyors. Others include belt, slat, chain, pushbar or sectional conveyors as well as spiral chute systems.



Standard Roller Conveyors are available from stock in a wide range of roller diameters, centers and frames.

Why not take advantage of Standard's half-century of conveyor application experience. Consult STANDARD CONVEYOR COMPANY. General offices: North St. Paul 9, Minnesota. Sales and service in principal cities.



Call the Standard engineer listed in your classified phone book or write direct for Bulletin 68 — Address Dept. Y-1.

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for a summary judgment holding that merger of Bethlehem Steel Corp. and Youngstown Sheet & Tube Co. would violate the antitrust laws. Judge Weinfeld postpones action until autumn.

The Supreme Court rules that Du Pont's ownership of a 23 per cent stock interest in General Motors violates the antitrust laws. Defense Secretary Wilson says Du Pont never exerted pressure on GM when he was president of the company.

Titanium Metals Corp. cuts mill product prices about 10 per cent in what it describes as its "sixth general markdown since 1954." Du Pont reduces titanium sponge 50 cents a pound.

Zinc falls from 11.5 cents to 10.5 cents. Trade sources hold little hope for the Agriculture Department's barter program as a means of absorbing the world's surplus.

Lead is reduced 1 cent a pound, to 14 cents—the lowest price since August, 1954. Copper declines from 32 cents to 29.25 cents as world markets exert pressure on U. S. quotations. The nickel shortage eases as the government declares a moratorium on purchases for its strategic stockpile.

GM announces it will market its Europe-built Vauxhall and Opel cars in the U. S., at prices below the Chevrolet's.

Walter Reuther, UAW president, informs union locals that officers who invoke the Fifth Amendment in public hearings will be subject to union action. AFL-CIO President Meany tells the Teamsters they must get rid of Dave Beck if they want to stay in the federation.

David J. McDonald, USW chief, asserts that U. S. Steel Corp. could absorb the impending wage increase without raising prices and still show a substantial profit increase over 1956.

Ernest T. Weir, founder and retired chairman of National Steel Corp., dies at the age of 81.

July

STEEL PRICES are raised an average of $6 a ton, about 4 per cent, by U. S. Steel Corp. The increases go into effect simultaneously with wage boosts and additional fringe benefits (estimated at

OA

9" column 3'-4' arms

1A

9"-11" column 3'-4'-5' arms

3A

13"-15"-17" column 4'-5'-6'-7' arms

4A

19" column 6'-7'-8' arms

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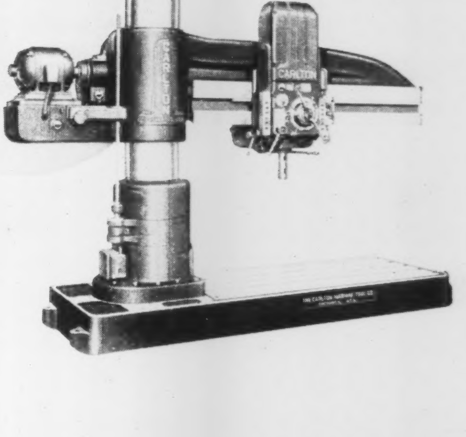
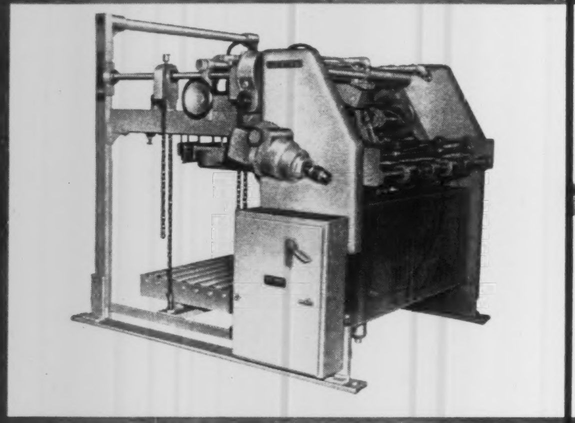
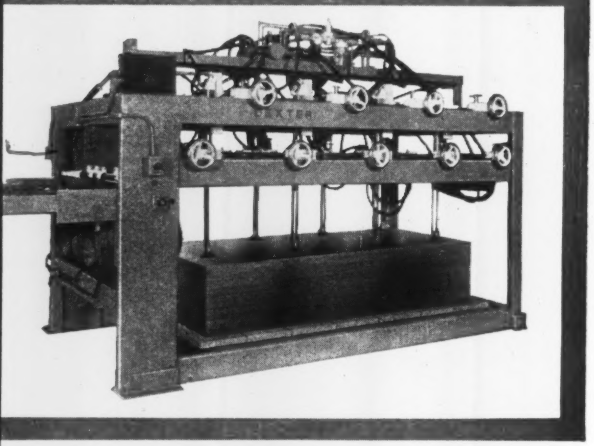


NEED HELP WITH Sheet Handling Problems?



Dexter 9000# H.D. Feeder runs at speeds up to 9000 sheets of tin plate per hour. Used primarily in most major metal decorating plants.



Dexter Plate Feeder handles metal plates up to 3/16" thick and a maximum size of 4-by-12 feet. Used in many plants for feeding descaling equipment.

CHECK WITH DEXTER

Dexter's been designing and building sheet handling equipment for over 75 years...*sheet feeders* for metal decorating presses, scroll shears, punch presses, coaters, slitters...*pack turnovers* for speeding up two operation processes...*oven strippers* and *pilers...cardboard* and *corrugated board feeders* for presses and packaging lines ...*paper feeders* for printing presses, varnishers and folding machines. For almost any sheet feeding problem Dexter has the answer...with its wide range of equipment.

Dexter Feeders are available in over a hundred sizes, speeds and load capacities to suit individual machine or process requirements. Sheet sizes range from 14 x 14" to four by twelve feet...sheet thickness from .006" to 3/16" or more...load capacities from 6,000 to 30,000 pounds ...and speeds from 600 to 9000 per hour!

Thousands of Dexter sheet handling machines are in use today in container plants, electrical equipment factories, appliance manufacturing plants, in tin plating lines, printing and binding companies, and in a wide variety of other industries...speeding up production efficiently and economically.

If you need help with your sheet feeding problems—check with Dexter. Their combination of engineering experience and equipment flexibility may be the solution for increasing your productivity.

Write or call for complete details.

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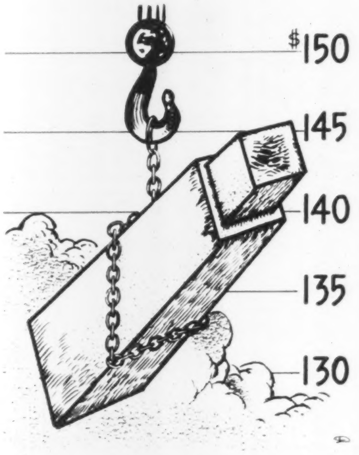
FOLDER COMPANY
DIVISION OF MIEHLE-GOSS-DEXTER, INC.

General Offices: 219 East 44th Street, New York 17, New York

21 cents an hour) for 700,000 United Steelworkers.

Rep. Leslie C. Arends (R., Ill.) charges that the industry ignored President Eisenhower's plea for voluntary action to restrain inflation. Treasury Secretary Humphrey tells the Senate Finance Committee that the higher prices will have a widespread inflationary impact. In rebuttal, a major producer calls the increases "grossly inadequate."



Steel prices rise

Machine tool orders jump sharply, apparently reflecting a rush to beat price hikes. Incoming business is $55.5 million—up 30 per cent from June bookings, but still below the July, 1956, volume of $61.9 million.

Ordered to knock more than $1 billion out of its 1958 spending plans, the Air Force warns contractors it won't pay for overtime. It cancels development of North American Aviation's Navaho missile but awards General Electric a $158-million contract for missile nose cones.

Record first half sales ($2.34 billion) and net ($231.4 million) are reported by U. S. Steel Corp. Sales of $1.36 billion and earnings of $103.7 million give Bethlehem Steel Corp. record results. Republic Steel Corp.'s sales ($692.7 million) and earnings ($52.9 million) represent all-time highs for six months.

Increasing its auto assemblies by 52 per cent, Chrysler Corp. chalks up record first half sales ($2 billion). Ford Motor Co.'s

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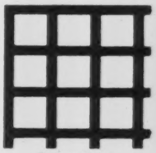

Square holes

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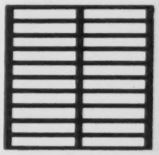
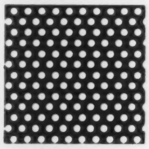
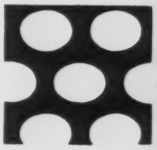


Slots

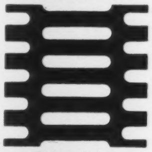


Round holes

Perforated metal can be ordered with special finishes: aluminum—color anodized or brushed and lacquer finish; steel—painted, chrome plated, enameled, japanned or other baked-on finish. Decorative patterns can be embossed if requested.



Oval holes



Oblong holes

Many patterns in steel sheets (industrial or decorative) are in stock at our warehouses. Send for H & K Stock List Brochure.

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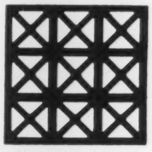

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sales top $3 billion for the first time in any half-year.

Major cement producers hold out against an industry-wide labor pact. Strikes at 75 of the nation's 170 cement plants idle 16,000 workers and threaten construction projects in the East and South.

Aluminum Co. of America and Kaiser Aluminum & Chemical Corp. reach agreement with the General Services Administration to limit their sales of domestic surplus to the U. S. while they're importing aluminum from Canada. GSA rejects International Nickel Co.'s proposal that the government agree to buy part of its expanded output.

August

SWITCHING from manned military aircraft to missiles and from piston-driven commercial airliners to speedier jet craft, America's plane builders face cutbacks in government spending and a scramble for contracts. Immediate effects: Scattered layoffs, a general belt tightening by aircraft makers, and widespread confusion over the government's procurement policies.

Air Force shifts to missiles

Roger M. Blough, chairman, U. S. Steel Corp., tells the Senate Judiciary Subcommittee that steel price increases had a "negligible" effect on living costs and that uniform prices throughout the industry result in more competition, not less.

Defense Mobilizer Gordon Gray says the government will stop buying lead and zinc for its strategic

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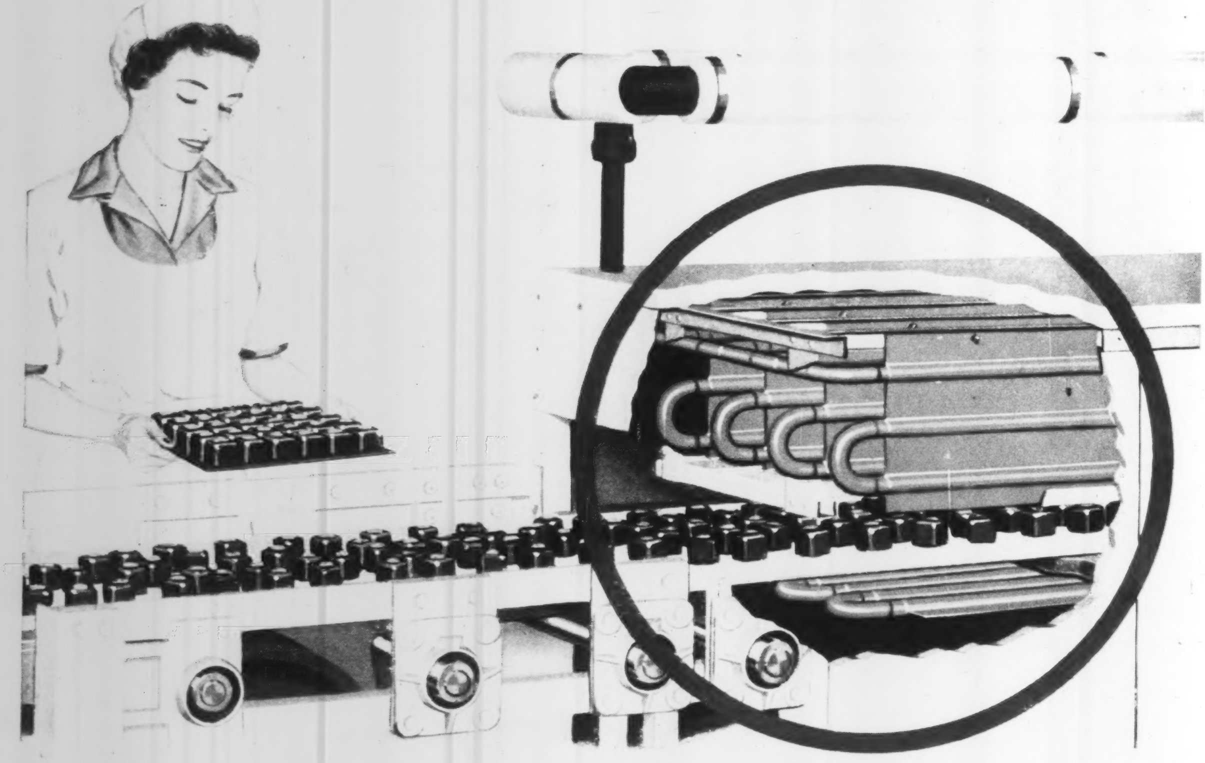
Copper, painted black to increase heat absorption, cuts cooling-time 40%, increases production 66%, in Barricini's Long Island City factory.



Use COPPER

...and cut cooling-time!

One thing a candy manufacturer worries about is the shelf-life of his chocolates. And he knows that the difference between stability and discoloration may be a question of the *rate* at which his product *cools.*

The Barricini candy makers found *radiant* cooling . . . with *Copper* . . . an ideal answer.

Former methods kept candy in the cooling tunnel for 12.2 minutes. Now, cooled with Copper, it goes through in 7.3 minutes.

That's 40% faster . . . and cutting cooling-time increased production 66%. Copper saved floor space, the cost of additional machines, and *time . . . where time is money!*

Copper stands alone in its efficiency wherever heat transference is involved. That's why manufacturers of heating . . . or cooling . . . products prefer Copper! And they find Copper or any of its alloys easy to work . . . easy to machine, form, draw, stamp, plate and join. They can count on an ample supply of Copper, too!

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stockpile in the next few months. He favors boosting U. S. tariffs on the metals.

Aluminum Co. of America raises the price of pig aluminum from 25 to 26 cents a pound. Copper producers trim their quotation from 29.25 cents to 28.5.

The Senate approves U. S. bartering of farm surpluses for strategic materials with Iron Curtain nations except Russia, Red China, and nations controlled by Red China. Its finance committee drafts legislation which would limit fast tax writeoffs to facilities supplying the military services or the Atomic Energy Commission.

Interstate Commerce Commission authorizes freight rate increases of 7 per cent for eastern and western railroads and 4 per cent for southern roads.

Federal Housing Administration lowers minimum down payments on mortgages and raises the maximum interest rate lenders can charge on FHA-backed mortgages from 5 to 5.25 per cent.

Bankers Trust Co. of New York raises its prime rate on loans to commercial borrowers from 4 to 4.5 per cent, the highest rate it has charged since the thirties. Other banks follow suit. As a countermove, the Federal Reserve Board boosts the discount fee on loans to member banks from 3 to 3.5 per cent.

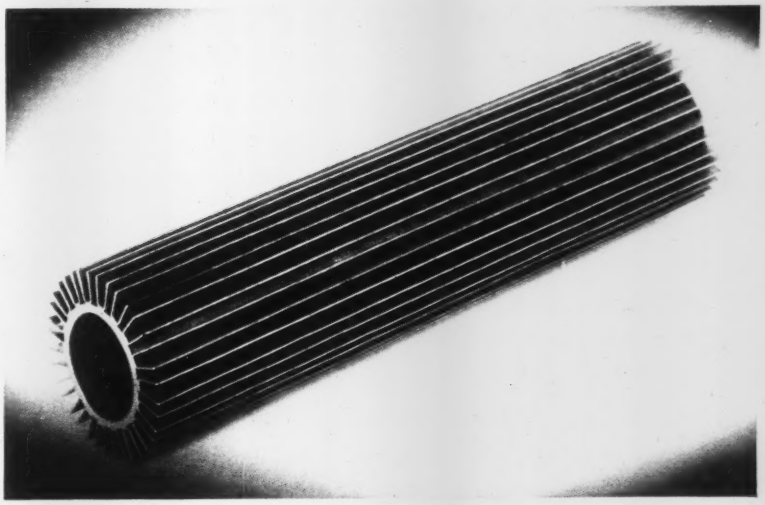
GM rejects Walter Reuther's proposal that it sell 1958 cars for $100 less than prices on current models. Harlow Curtice suggests that the UAW extend its present contract for two years beyond the expiration date, May 29, 1958.

President Eisenhower nominates Neil H. McElroy, president of Proctor & Gamble Co., to succeed Charles E. Wilson as secretary of defense.

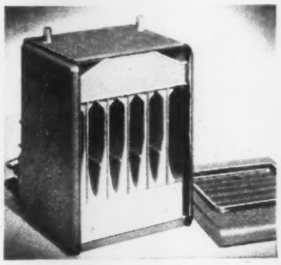
September

INDUSTRIAL production falls sharply during the Labor Day week as expected, but fails to rebound with customary vigor. For the first time in 1957, STEEL's industrial production index lags 8 points behind the 1956 level.

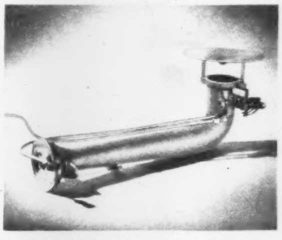
Trouble spots continue to erode confidence. Defense cutbacks force more layoffs in aircraft plants. Ap-



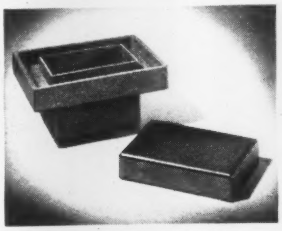
Heat exchanger used in evaporators and condensers will withstand 1600° F indefinitely.



Stainless Alloy Surface protects heat exchanger element in gas-fired unit heater which operates at approximately 1600° F.



Stainless Alloy Surfaced flame spreader replaces Stainless Steel spreader normally used in fuel burner nozzle at a 40% cost saving.



Heat treatment retorts operating up to 2600° F can be protected against heavy oxidation which reduces service life.

Heat Protection

Up to 2600° F.

Steels having a carbon content from 1008 to 1053 can now be given a *Stainless Alloy Surface* providing heat resistance equal to that afforded by Stainless Steels. A new, low-cost process — ASC Metal Diffusion — creates by atom interchange a chromium-rich surface that gives unlimited heat protection at 1600° F. and limited protection up to 2600° F.

Unlike coatings, platings and claddings, an ASC Stainless Alloy Surface becomes an integral part of the processed work. It will not chip, peel, craze or crack. The Process is applicable to all iron, steel, and ferrous alloys — and forming, welding, brazing and soldering, can be done by methods in general use.

ASC Metal Diffusion also gives low and medium carbon ferrous products *corrosion* resistance equal to that of 430 stainless. Medium and high carbon content products can be given *wear* resistance surface hardness of RC 70-72. For more information about this revolutionary process write for data, consultation, or product demonstration.

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pliance sales gain little momentum. Freight car backlogs decline steadily. Machine tool orders plummet to $28.8 million, 35 per cent under August's bookings ($44.5 million) and 64 per cent below orders received in September, 1956.

Major copper producers slash their price by 1.5 cents to 27 cents, the lowest quotation in more than four and a half years. H. Y. Bassett, president, Calumet & Hecla Inc., says his company is losing money and may have to suspend mining operations in the high-cost Michigan area.

Phelps-Dodge Corp. proposes to the American Mining Congress that tariff assistance be sought in 1958. The U. S. should impose a duty of at least 4 cents a pound on imported copper, it contends.

The Teamsters brush off AFL-CIO charges of corruption. In a statement to the federation's ethical practices committee, they deny that corrupt forces dominate their union.

The Justice Department insists that Du Pont divest itself of stock in General Motors Corp., as ordered by the Supreme Court. Government lawyers reject Du Pont's offer to relinquish voting rights on the stock.

Stocks falter as business declines

Bethlehem Steel Corp. and Youngstown Sheet & Tube Co. file affidavits in federal court, Southern District of New York, showing why their merger would not reduce competition in the steel industry. Arthur B. Homer, Bethlehem's president, says his company will spend $358 million to expand Youngstown's capacity if the merger is approved.

Reynolds Metals Co. and Esso Standard Oil Co. sign a year's contract calling for 35 million to 60 million quart motor oil cans made of aluminum. Reynolds will supply the sheets; the cans will be fabricated by American Can Co. and Crown Cork & Seal Co

Directors of Copperweld Steel Co. and Superior Steel Corp. approve a merger of their companies, to be effected by issuing three shares of Copperweld common stock for every four shares of Superior. A federal judge approves a reorganization plan for Northeastern Steel Corp. which involves the sale of its assets to Carpenter Steel Co.

October

AFTER nine months' exposure to Congressional criticism, the ad-

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57.12.4

Why jet engines are harnessed with *Carpenter* Welded Stainless Tubing

Reason One: For measuring their exhaust temperature. They're harnessed with the circular assembly of 1″ O.D. Type 430 Carpenter Tubing shown above. Inside it are two wire loops connected to thermocouples on the engine tail-cone. Made in diameters of 12″ to 36″, this harness has to withstand up to 1000-degree heat, corrosive fuel and atmosphere, engine shock and vibration.

Reason Two: Type 430 Carpenter Tubing provided *more* than the strong resistance to heat, corrosion and shock, and the low coefficient of expansion required in this punishing service. Being *welded* tubing, its uniform walls, working properties and dimensional accuracy to 0.003″ throughout were important production advantages for the "harness-maker". Precise bending, flaring and other fabricating operations were accomplished trouble-free.

Next time you need stainless tubing for pressure, corrosion resistance, mechanical, structural or sanitary requirements, call in your nearby Carpenter Representative or Distributor. Have him tell and show you why the quality and uniformity of the welded tubing he sells saves time, trouble and money. Meantime, send for Selecting and Buying Guide, Bulletin T.D. 120.

You are sure of getting all these tubing advantages from Carpenter:

• Uniform wall thickness throughout the length of the tube • Smooth surfaces, I.D. & O.D. • Uniform analysis • Guaranteed 100% pressure tight • Maximum workability • Full corrosion resistance throughout • Heat exchanger quality • Widest range of analyses • Lower initial cost.

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more than corrosion resistance

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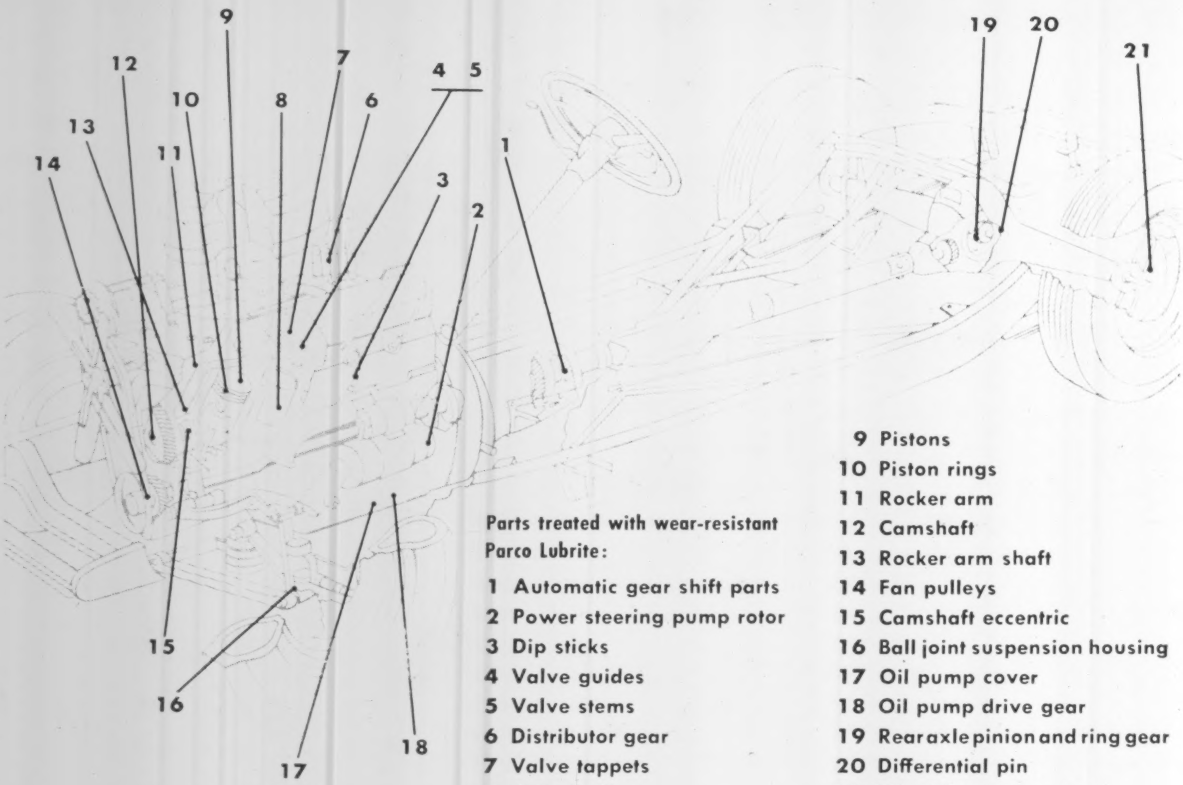

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11 Rocker arm
12 Camshaft
13 Rocker arm shaft
14 Fan pulleys
15 Camshaft eccentric
16 Ball joint suspension housing
17 Oil pump cover
18 Oil pump drive gear
19 Rear axle pinion and ring gear
20 Differential pin
21 Wheel bearing races

The automotive industry shows how to save money by using Parco Lubrite

Wearing surfaces—the vital parts that move or roll or slide against each other—can cost the manufacturer far more than their original price.

If one of them fails prematurely in use, because of improper break-in, there's the cost of replacement, the field service charge, and the customer's ill-will to be reckoned with.

To promote smooth, safe initial operation, to prevent galling, scoring and welding, and to lengthen subsequent life, friction parts should be treated with Parco Lubrite.

This nonmetallic, oil-holding coating eliminates metal-to-metal contact during wearing-in, keeps a film of lubricant between bearing surfaces, provides priceless protection for fractions of pennies.

Automobile manufacturers have cut field service costs by the use of Parco Lubrite. How about *your* product? Let the Parker technical representative investigate for savings!

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heavy duty maintenance paints since 1883

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ministration's budget is higher than ever. Outlays for fiscal 1958 are estimated at $72 billion—$200 million more than the President proposed in January.

Aircraftmakers retrench to meet the limitations on monthly payments imposed by the Air Force. Republic Aviation Corp. announces additional layoffs affecting 2500 to 3000 employees. Boeing Airplane Co. says it may have to reduce its output. Both companies hint they'll have to borrow money to finance deliveries.

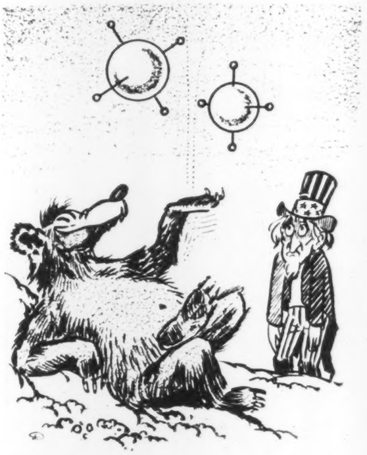
Inventories held by manufacturing, wholesale, and retail firms decrease $300 million—the first decline in nearly three years. The shrinkage reflects increased caution on the part of businessmen, says the Commerce Department.

Living costs level off after pushing into new high ground for 12 successive months. The government's price index holds at 121.1 per cent of the 1947-49 average, unchanged from September, but 2.9 per cent higher than it was a year ago.

Industrial production slips to 142 per cent of the 1947-49 average, down 2 points from September and 4 points below October, 1956. Personal income recedes to a seasonally adjusted annual rate of $345.5 billion—$1 billion lower than it was in September.

Machine tool orders fall to $27.9 million, the lowest level since February, 1950. Bookings are down 3.3 per cent from September's and 58 per cent from the October, 1956, total.

On the brighter side, residential



Russia wins satellite race

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building contracts score their sharpest increase of the year. Awards rise to $1.1 billion, 11 per cent above the October, 1956, mark.

Russia astounds the world by firing a satellite into outer space. President Eisenhower congratulates the Soviets on their feat but minimizes its military significance. Congressional leaders demand a speedup in missile development. Defense Secretary McElroy pledges he'll eliminate "bottlenecks."

The Air Force scraps the ceilings it previously set on its periodical payments to key contractors, replacing them with "expenditure targets" it hopes to maintain without flat limits.

Chief Justice Warren turns down the petition of 13 rank-and-file Teamsters to enjoin the union from holding a "bogus" election. James Hoffa is elected president. Sen. John L. McClellen (D., Ark.) says Teamster records show that Hoffa wasn't legally elected.

November

RUSSIA sends a second satellite into space, carrying a small shaggy dog. Muttnik weighs 1120 lb, about six times as much as Sputnik I; its maximum altitude is 1056 miles, vs. Sputnik I's 560.

A top Pentagon official doubts that the new Soviet satellite will have any further impact on America's missile programs. More important, he believes, is the Russian claim of successfully testing an ocean-spanning ballistic missile. Sen. Lyndon Johnson (D., Tex.) calls for "bold new thinking" in American defense and foreign policy.

Appearing before a Senate Judiciary subcommittee, George M. Humphrey, National Steel Corp.'s chairman, flatly rejects a proposal by Sen. Estes Kefauver (D., Tenn.) for a cut in steel prices of at least $3 a ton. He says his company won't consider price changes of any kind, "either up or down," until it has a better idea of the impact of higher wages.

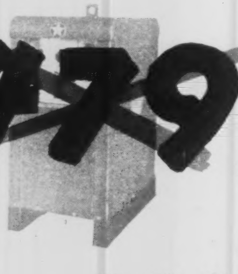
The U. S. Court of Appeals upholds an injunction barring James Hoffa from office. (The temporary order was signed Oct. 23 by U. S. District Judge F. Dickinson Letts.) It prevents President-elect Hoffa and other officers from taking office pending a trial of charges that the Teamsters' convention was rigged.

"Hot cargo" clauses in contracts between the Teamsters' union and common carrier truck lines are ruled invalid by the National Labor Relations Board.

In a move to help revitalize the nation's lagging economy, the Federal Reserve Board reduces the discount rate from 3.5 per cent to 3 per cent.

Sir Ronald Prain, head of Northern Rhodesia's two big copper groups, urges producers to cut their output. Such a move is essential, he contends, if the oversupply situation is to be corrected and stability restored to world markets.

President Eisenhower suffers a cerebral occlusion, his third major illness in two years. Stocks break sharply, with the ticker tape running 7 minutes behind floor transactions. Dow-Jones industrials



THE ~~479~~ DAY TEST: → 510

it's a RECORD!

510

We knew they were good . . . the trade knew they were good . . . welding engineers knew they were good. But nobody was prepared to forecast that the new Miller line of GOLD STAR welders would erect a startling milestone in welding history . . . in welder performance!

In August, 1956, Miller began production on a new completely sealed semi-metallic rectifier. The date proved to be significant in welding circles. For ~~479~~ days later NOT A SINGLE FAILURE HAD BEEN REPORTED FROM THE FIELD!

A new transformer design teamed with the revolutionary completely sealed semi-metallic rectifier led to the introduction of the Miller GOLD STAR series of rectifier type dc and combination ac-dc machines.

Today, weldors everywhere agree that Miller GOLD STAR machines give you:

a. The best welding current ever produced,
b. Record-making dependability.

510

The 479 day test was made on thousands of Miller GOLD STAR welders working under every conceivable condition—indoors—outdoors—in hundreds of industries.

Here indeed is an all-time record for welder and rectifier reliability.

miller ELECTRIC MANUFACTURING CO., INC.
APPLETON, WISCONSIN
distributed in Canada by CANADIAN LIQUID AIR CO., LTD. Montreal

(Advertisement)

Chemical Prepaint Treatments for Metal Surfaces

What they do, the types available, how they are applied

By J. H. GEYER
Manager, Product
Development Dept.,
AMERICAN CHEMICAL
PAINT COMPANY

Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

The prepaint preparation of the metal surface is therefore a highly important part of the system. Chemical prepaint treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

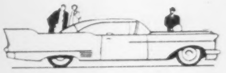
Basically, there are four types of chemical prepaint treatments. These are phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate. Each is discussed briefly in the following paragraphs.

Phosphoric Acid

Perhaps the most widely used and certainly one of the most economical chemical prepaint treatments is the phosphoric acid cleaner combination materials. ACP Deoxidine® is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.

Iron Phosphate

Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances such as water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine,® ACP's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.



Zinc Phosphate

ACP Granodine® is an example of this type of chemical prepaint treatment process, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, and acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. ACP Lithoform® is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.

Amorphous Phosphate and Chromate

These coatings are the films produced by the ACP Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, mechanical spraying, or roller coating equipment. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip, spray or roller coating application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a deoxidizer in the line is needed.

The major chemical prepaint treatments for metals have been covered briefly in this article. More complete information can be had by contacting an ACP sales representative or by writing us at Ambler, Pa.

CHEMICALS
ACP
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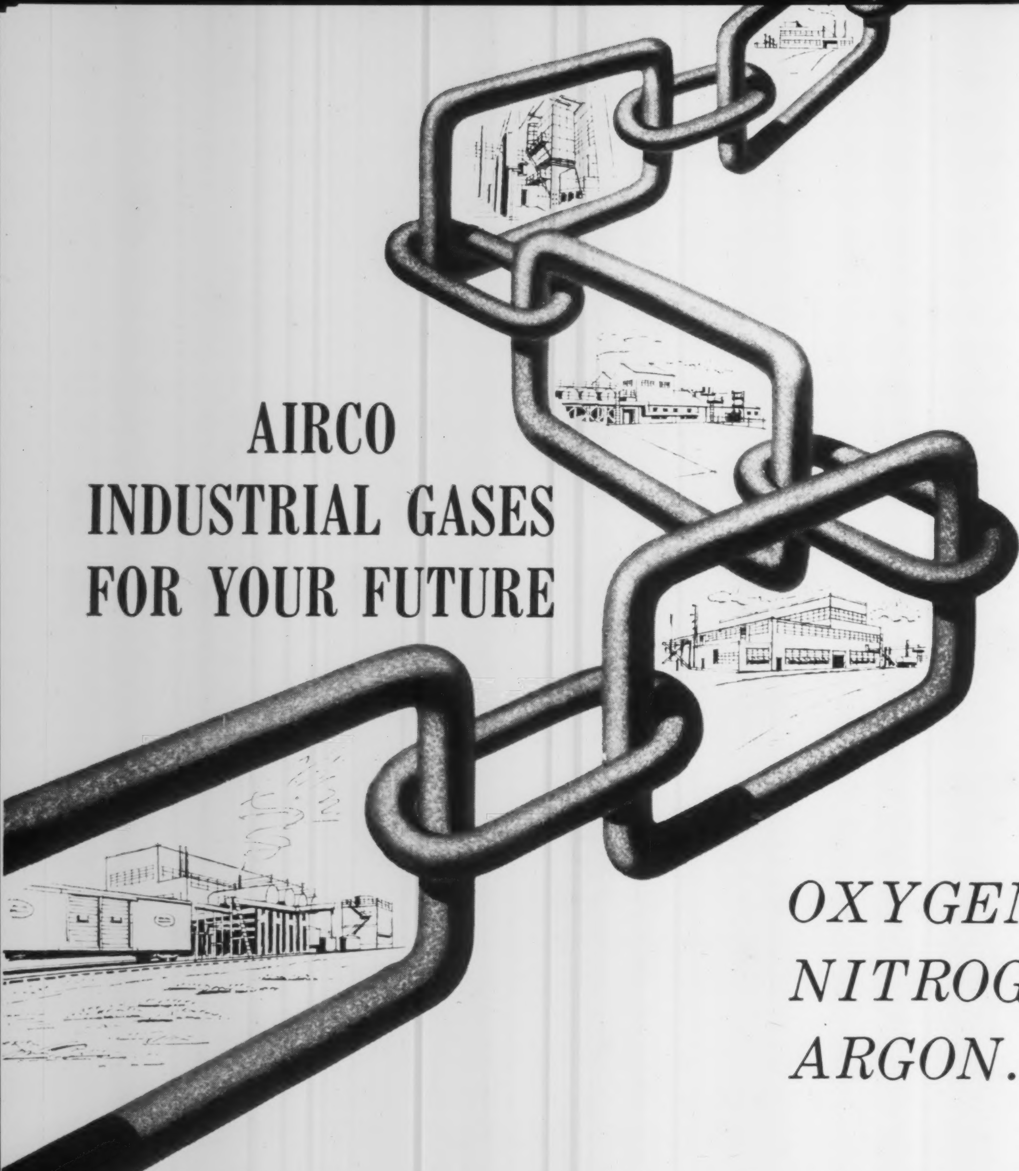
New Chemical Horizons for Industry and Agriculture



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FOR YOUR FUTURE

OXYGEN...
NITROGEN...
ARGON...

To help supply the ever-increasing demands for industrial gases, Airco is forging new links to a growing chain of producing plants criss-crossing the country. Some of these new facilities are already in operation, others will be in operation by the latter part of this year. This multimillion dollar construction program will greatly increase our capacity to supply your present and future requirements for oxygen, nitrogen, argon and other gases.

The goal of this expansion effort is to gear each Airco plant to serve the needs of its own area—and also to support the customers of any Airco plant in an adjacent territory by providing deliveries of the industrial gases needed in the quantities required.

The services Airco offers its customers are well worth your consideration. Let your nearest Airco office help plan the most economical gas supply for your needs and the most efficient way to use it.

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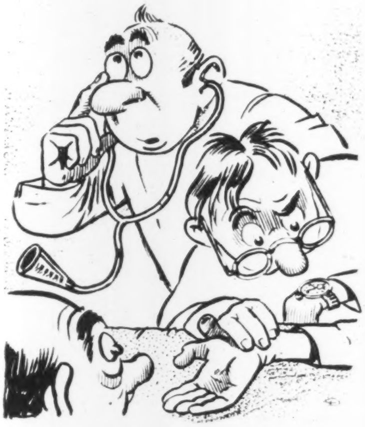
Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide — gaseous, liquid, solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl acetate, alcohols, and other synthetic resins.

tumble 9.04 points.

Pittsburgh Steamship Div., U. S. Steel Corp., unveils a $100-million program for construction of 12 iron ore ships for the Great Lakes trade. Vessels with cargo capacities of 20,000 to 25,000 tons are under consideration.


President suffers mild stroke

Defense Secretary McElroy orders resumption of overtime work on three Air Force missiles: Thor, Atlas, and Titan.

December

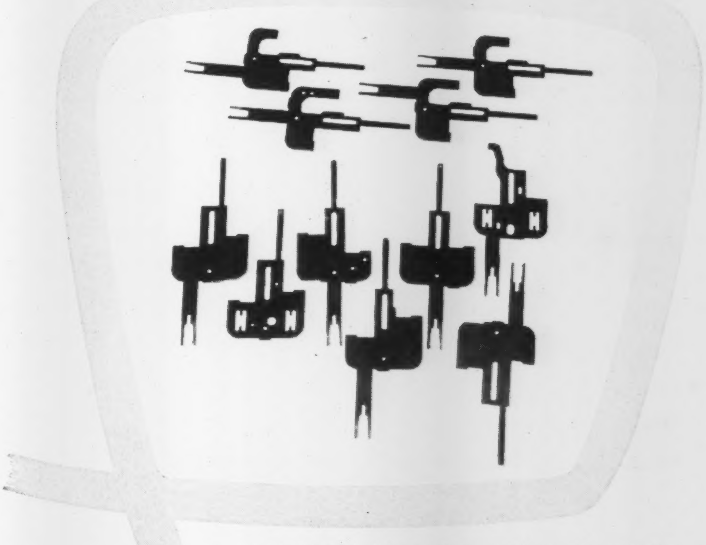
PRESIDENT EISENHOWER visits his office and presides over a cabinet meeting. His physician, Maj. Gen. Howard M. Snyder, tells newsmen the President's recovery "continues to be excellent."

The 19 unions in the AFL-CIO building trades department unanimously call on the federation's convention to restore the Teamsters' union to good standing. But when Teamster President-elect Hoffa refuses to give up his post, as demanded by AFL-CIO President Meany, the federation carries out its expulsion threat.

Labor Secretary Mitchell assures the AFL-CIO that the administration will not propose extension of the antitrust laws to labor unions. It will press, he says, for full disclosure of union funds and procedures; secret ballot election of union officers; tightened bribery restrictions; stronger legal bans on labor boycotts; a ban on "hot cargo" clauses.

Richard J. Gray, president,

push button driving...
and the ROTO FINISH® story behind it...


Intricate steel slides used in push-button transmission control assembly, deburred by Roto-Finish

3000 PIECES PER HOUR DEBURRED AUTOMATICALLY

That's the story of *one Roto-Finish* machine installed in a Detroit automobile plant to deburr push button transmission control slides. All the operator does is load parts into the machine. The balance of the 30 minute cycle is entirely automatic. Man power savings are tremendous!

PROCESSING MATERIAL COSTS FOR 100 PARTS—JUST 2¼¢. The cost of processing materials, both chips and compound, is .0223¢ per piece.

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PUT ROTO-FINISH ENGINEERING SKILL AND OUR YEARS OF PROCESSING EXPERIENCE to work for you. In either your plant or our laboratory, our process engineers will prove, *before you buy*, that Roto-Finish provides the finish you want at a lower cost. Phone or write today.

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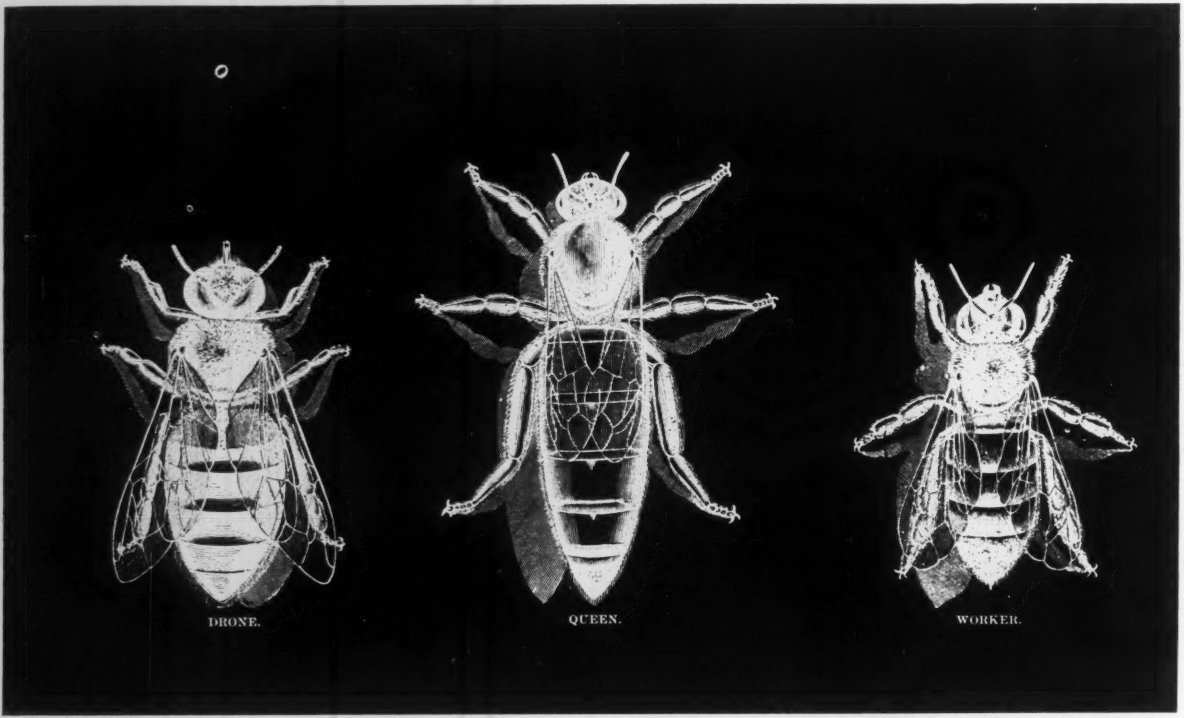
DOES A HONEYBEE HAVE AN ANSWER TO CANCER?



Mouse and man, worm and wasp, pig and protozoa — these are some of the twenty-eight living things used in the American Cancer Society's nation-wide research program.

Scientists rely most — in 189 projects — on man; next comes the mouse — in 139 studies — and there is even a honeybee helping one scientist in his search for facts that may save the quarter of a million Americans now dying each year of cancer.

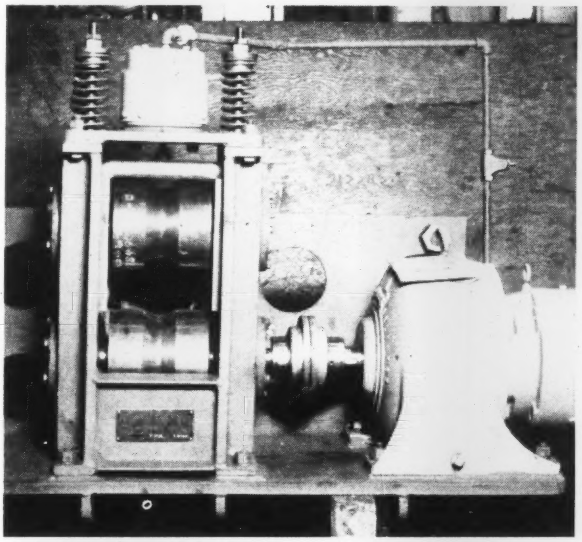
Many organisms. Many laboratories. Many hundreds of scientists. Together they make up a balanced program of research with freedom and flexibility, reaching across the country and across scientific disciplines, to tap the best minds and the best ideas.

From these twenty-eight organisms science is getting facts that may save more lives tomorrow. But what of today? What of you?

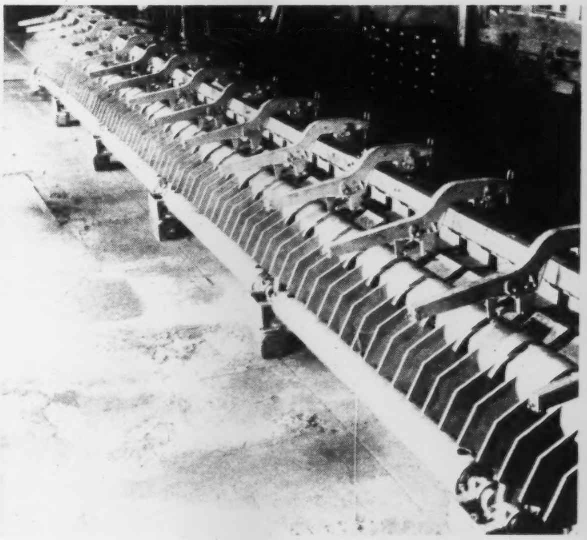
With early diagnosis, half of those with cancer can now be cured if treated promptly. If you have cancer, you may well be saved — but only if you give your doctor a chance. Go to him for an annual health checkup . . . not because you feel ill, but because you feel good and want to stay that way.

The worm and the wasp, the pig and the protozoa will provide the answers for tomorrow: for today, see your family doctor.

AMERICAN
CANCER
SOCIETY



Pinch Roll Unit for 14" Mill



Cooling Bed Runin Table with Overhead Packing Mechanism

in BIRDSBORO mill machinery—the only standard is what's best for your operation

That's why we say that only *special* mill machinery is turned out of our shops. Each piece of equipment is custom-designed. Each step of its manufacture is taken with your needs in mind. And more than 50 years of "customized" service to industry has given BIRDSBORO important know-how with nearly every type of mill machinery made today . . . as well as with the new equipment that automation and higher production quotas will demand. Your Birdsboro representative will be happy to discuss past accomplishments and future possibilities, and how they can help you.

Main Office, Engineering Department and Plant:
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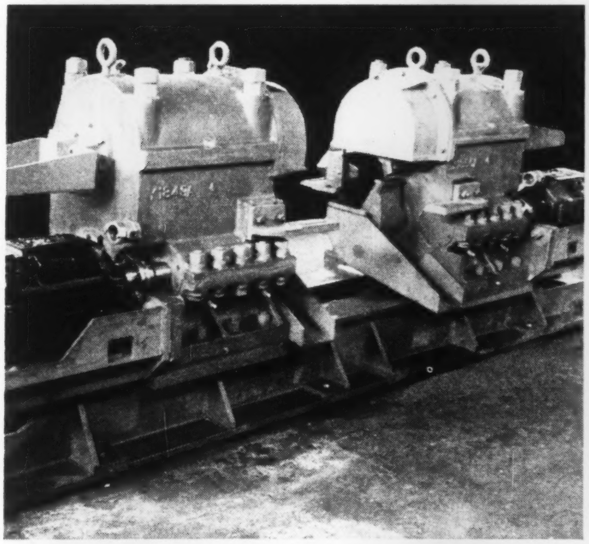
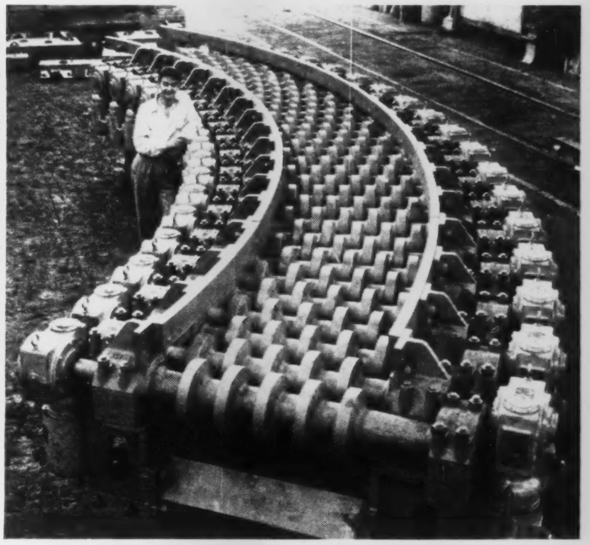
STEEL FOUNDRY AND MACHINE CO.
STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • STEEL CASTINGS • Weldments "CAST-WELD" Design • ROLLS: Steel, Alloy Iron, Alloy Steel



Two Flying Shears

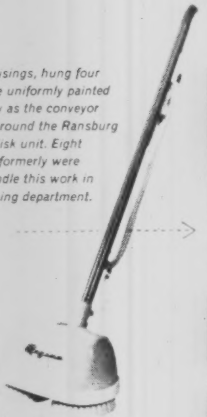


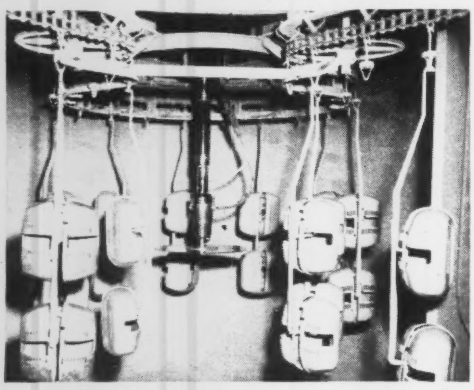
Furnace Discharge Table (Curved Section)

Regina Reports 50% Paint Saving with RANSBURG NO. 2 PROCESS

Electrostatic Spray Painting

That's because Ransburg No. 2 Process puts the paint on the product instead of up the stack





Aluminum housings, hung four to a fixture, are uniformly painted electrostatically as the conveyor makes a loop around the Ransburg reciprocating disk unit. Eight hand sprayers formerly were required to handle this work in Regina's finishing department.

The Regina Corporation, Rahway, N. J., replaced hand spray with Ransburg No. 2 Process to paint their twin-brush Floor Polisher and Scrubber, and their Electrikbroom.

Now, a single reciprocating disk unit automatically handles the work which formerly required eight hand sprayers. Even with increased production, Regina is using 50% less paint. Quality of the work is improved with maximum uniformity on all parts.

NO REASON WHY YOU CAN'T DO IT, TOO! Want to know what Ransburg No. 2 Process will do for you in your finishing department? If your present production justifies conveyorized painting, let us prove the many cost-saving benefits which can be yours. Write for our No. 2 Process brochure which pictures many on-the-line examples of electro-coating on a wide variety of products, and describes our free survey service.

Ransburg ELECTRO-COATING CORP.
Indianapolis 7, Indiana

RANSBURG

AFL-CIO expels Teamsters

AFL-CIO building trades department, asks construction workers to fight inflation by giving up their demands for wage increases. His recommendations fall on deaf ears as the AFL-CIO announces its objectives for 1958: "Sizable" wage boosts and a shorter work week.

Pittsburgh's Duquesne Light Co. begins to generate electricity in America's first full scale atomic-electric powerplant, Shippingport, Pa. The government awards New York Shipbuilding Corp. a $20-million contract to build the hull of the nation's first atomic-powered merchant ship.

America's much publicized satellite carrier, the Vanguard, blows up on its launching pad. Vice President Nixon admonishes his fellow citizens to "get away from their weeping walls and act like Americans."

F. W. Dodge Corp. indicates that housing starts have bottomed out and will rise to 1,075,000 in 1958, a 6 per cent increase over this year's total.

General Electric's 1957 sales and earnings will reach new highs, says Ralph J. Cordiner, president. But he believes business during the first six months of 1958 may taper off a bit for the electrical equipment industry and for the economy as a whole.

Steel production during the first half of 1958 "will probably be somewhat below" that maintained in the current six-month period, but should improve in the closing months of the year, predicts Joseph L. Block, president of Inland Steel Co.

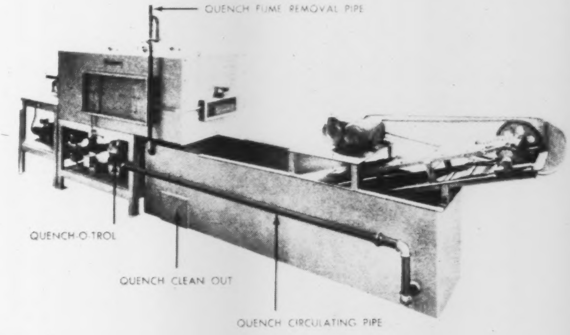
Shaker Hearth Furnace Handles Complicated Shapes

Bright hardening, carburizing, dry cyaniding, and similar heat treating operations requiring temperatures up to 1900° F can be done with this automatic furnace.

Complicated shapes can be heat treated without distortion because they are not pushed or mechanically handled.

Parts are heated in a protective atmosphere and dropped directly into a quench tank; parts can't oxidize while they're hot.

Three models have these capacities: 15 to 35 lb, 35 to 75 lb, and 75 to 100 lb. *Write*: Hevi-Duty Electric Co., Milwaukee 1, Wis. *Phone*: West 3-2756



Horizontal Boring and Milling Machines Are Rigid

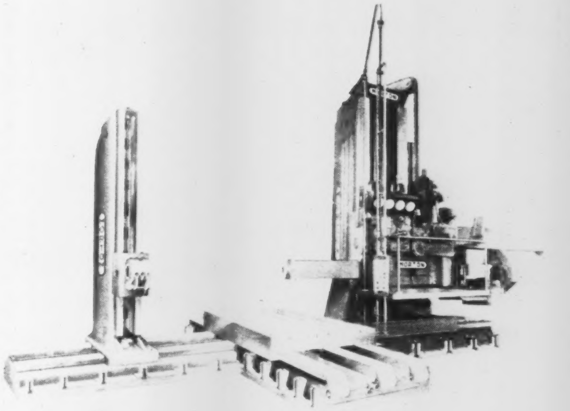
The square ram of this line makes the spindle rigid, insures accuracy, and eliminates interference when work is in restricted areas.

The rotating spindle is mounted in bearings in the ram and moves horizontally with it as a unit.

Both floor and planer types are available. Spindles are 5 to 10 in. in diameter, the rams are 8 to 14 in. square.

A line of accessories can be positioned within the full machine range, including right angle milling heads, speed-up heads, and right angle slotting heads. The accessories bolt on quickly.

Tapping attachments, boring bars, work tables, and other accessories are available. *Write*: Morton Mfg. Co., Broadway and Hoyt, Muskegon Heights, Mich. *Phone*: 3-2146



Tractor Loader Has Low Center of Gravity

The W-9 Terraload'r has a four-wheel drive and steers through the rear wheels, which carry 40 per cent more weight than the front ones. The rear wheels have hydraulic power steering.

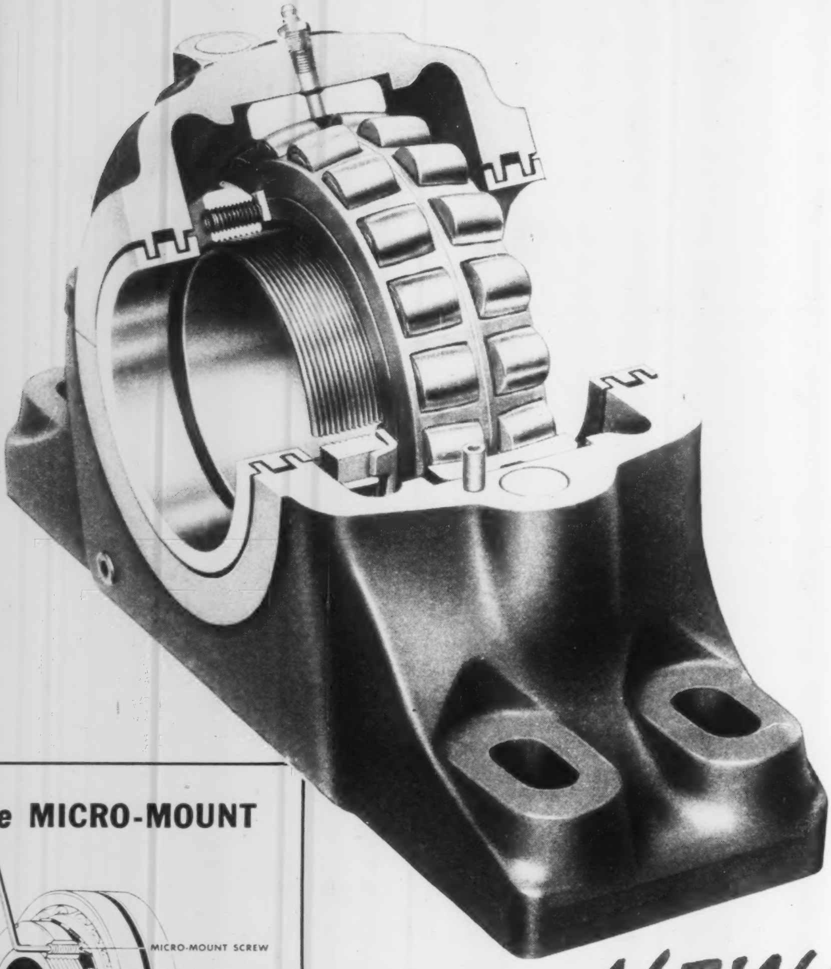
The loader does not have a tendency to buck or raise its rear wheels when digging in hard materials or carrying heavy loads.

An independent differential in each axle insures equal power to all wheels.

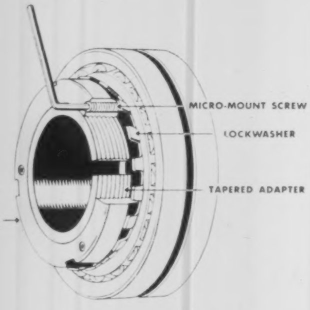
The truck reaches forward 7 ft; dump height is $62\frac{1}{2}$ in. Any one of three buckets can be used—a $1\frac{3}{8}$ cu yd, heavy duty bucket, a $1\frac{3}{4}$ cu yd standard bucket, or a $2\frac{3}{4}$ cu yd bucket for light material.

The breakout force is 11,000 lb at ground level.

Lifting capacity is 5500 lb with the bucket in the carry position. *Write*: J. I. Case Co., Racine, Wis. *Phone*: Melrose 4-6611



Exclusive MICRO-MOUNT



Fast and accurate mounting is made possible by the new Dodge Micro-Mount. The Adapter is snugged up with the Micro-Mount Nut. Mounting is completed by turning the Micro-Mount Screws against the Lockwasher until bearing, adapter and shaft form an integral unit.

NEW!

Spher-Align

SPHERICAL ROLLER BEARING PILLOW BLOCK

Dodge, the nation's leading supplier of mounted bearings, presents America's newest spherical roller bearing pillow block . . . a rugged bearing in attractive modern design . . . inherently self-aligning . . . easy to install . . . easy to maintain . . . and featuring the unique Micro-Mount.

Its rugged housing of close-grained semisteel withstands shock loads. It has a generous lubrication reservoir—for oil or grease. And standardized dimensions make Spher-Align interchangeable with all other similar units.

Expansion and non-expansion types. Stocked for 2 7/16″ to 8″ shafts. Call your Dodge Distributor—or write us.

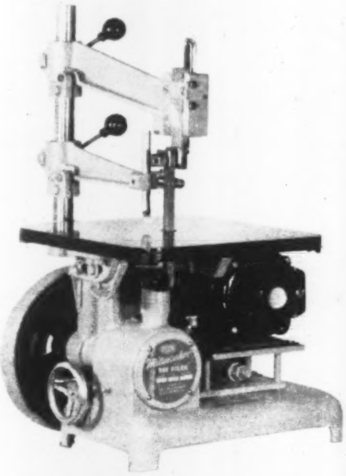
DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new methods. Look for his name under "Power Transmission Machinery" in the yellow pages of your classified telephone directory—or write us.

DODGE MANUFACTURING CORPORATION
6600 Union Street, Mishawaka, Indiana

Die Filer

Model FS-VSS has two controls that vary the speed from 100 to 475 strokes a minute and stroke length from 0 to 2 in.

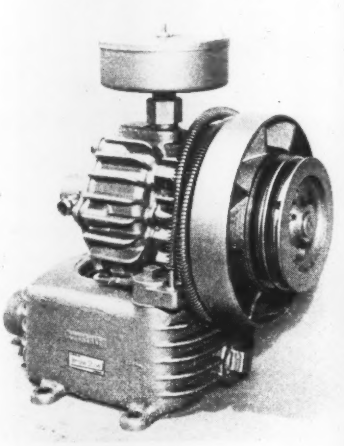


The upper and lower chucks are offset and have ball-jointed construction for faster chucking and easier alignment of files. *Write*: Rice Pump & Machine Co., Belgium, Wis. *Phone*: 5-2621

Rotary Compressor

Model R-L is a single stage compressor available in 1½ and 2 hp sizes.

The sliding vane principle of compression uses a rotor turning within an off-center housing. Compression of up to 200 psi is attained as entering air trapped between the sliding vanes is moved in an increasingly smaller space between the rotor and housing.



Vanes are held against the off-center housing by centrifugal force; oil in constant circulation seals the compressing components.

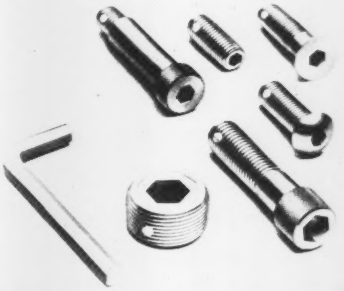
Discharge temperature is about 200° F. *Write*: Kellogg Div., American Brake Shoe Co., 530 Fifth Ave., New York 36, N. Y. *Phone*: Oxford 7-7000

Cap Screws

These socket head cap screws are self-locking. Sizes range from No. 0 to 1½ in. in diameter.

A nylon pellet inserted in the threaded section of the screws makes them self-locking. They can be used repeatedly without the loss of holding power.

The screws can be removed as easily as conventional ones but will not work loose under severe vibration.



Gas and fluids cannot leak past the nylon insert. The screws retain the locking action at −70 to 250° F through repeated heating and cooling cycles.

The nylon insert is resistant to water, commercial solvents, alcohols, oil, and boiling 40 per cent caustic soda. *Write*: Cleveland Cap Screw Co., 4444 Lee Rd., Cleveland 28, Ohio. *Phone*: Ludlow 1-3000

Mixing Ladle

This ladle has a capacity of 200 cu ft inside its refractory lining. It can handle materials with temperatures up to 3200° F.

The slagging spout is on the left and the boxed-in pouring spout is on the right. A removable section of hood (not shown) closes the

DODGE PRODUCTS you should know

TAPER-LOCK SHEAVES
Easy on — easy off! Mount flush!

TAPER-LOCK SPROCKETS
No reboring — no waiting!

TAPER-LOCK STEEL CONVEYOR PULLEYS
Maximum strength with minimum weight!

●

Write for Bulletins!

- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661.
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644.
- Taper-Lock Steel Conveyor Pulleys. Complete data. Bulletin D-56.

DODGE MANUFACTURING CORPORATION
6600 Union Street • Mishawaka, Indiana

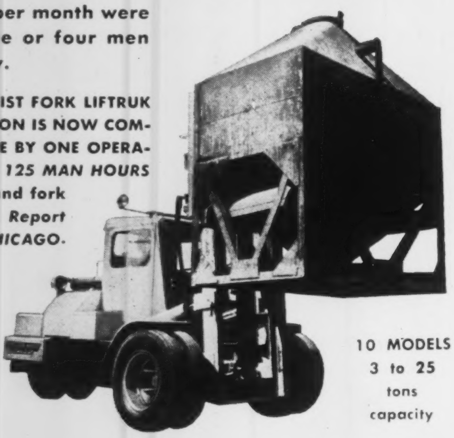
DODGE of Mishawaka, Ind.

SILENT HOIST LIFTRUK

INLAND STEEL IS SAVING approx. 125 MAN HOURS EACH MONTH on JUST ONE SPECIFIC REQUIREMENT

"Four to six cars of carbide per month were formerly unloaded by three or four men working eight hours per day.

"THROUGH THE USE OF SILENT HOIST FORK LIFTRUK Model FK 7½, THIS SAME OPERATION IS NOW COMPLETED IN A PORTION OF THE TIME BY ONE OPERATOR . . . *SAVING APPROXIMATELY 125 MAN HOURS PER MONTH*" . . . releasing men and fork truck for other useful purposes. *Report from INLAND STEEL CO. EAST CHICAGO.*



SILENT HOIST LIFTRUK is a real work horse — operates long periods without maintenance — on muddy or irregular terrain. STANDARD EQUIPMENT includes Fluid Drive, Power Steering, High Undercarriage, extra large torque multiplier for traction.

10 MODELS
3 to 25
tons
capacity

Ask for Bulletin No. 77.

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
849 63rd Street, Brooklyn 20, N. Y.

ACRO WELDER MFG. CO.
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WELDING ENGINEERS

MACHINERY BUILDERS

WELDING MACHINERY ENGINEERED
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AND SKILLFULLY AUTOMATED
TO MEET INDUSTRY'S MOST EXACTING
AND RAPIDLY CHANGING
PRODUCTION TOOLING REQUIREMENTS

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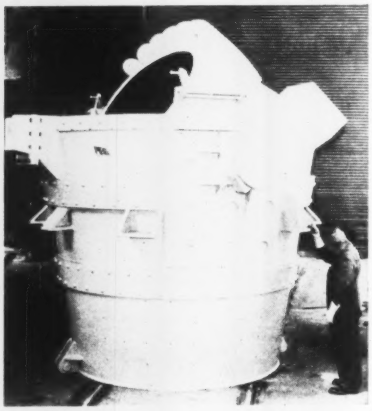
ESTABLISHED 1936



top of the ladle to prevent the loss of heat while in transit. This section has openings for burners.

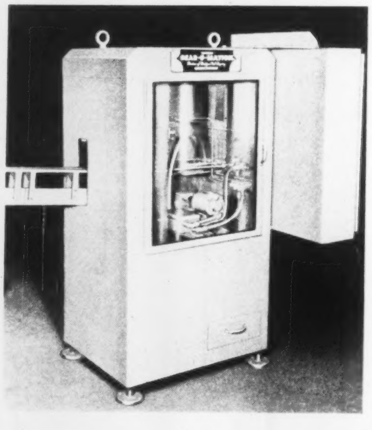
Two lugs on the bottom sides are used to tip the ladle in either direction. The U-shaped swinging brackets at the top edge lock the ladle to the carrying hooks to prevent tipping. *Write*: Pennsylvania Engineering Corp., New Castle, Pa. *Phone*: Oliver 4-5511

Part Handler

Machined castings (such as pump housings) are air cleaned, oriented, and elevated by this machine. The model shown moves 150 eight-lb castings through the three steps in an hour.

Standard components are used to build the units, which are tailored to specific parts.

Parts enter the unit through a gravity track to a stop position at the first station. Air jets working off shop lines clean the part. After cleaning, the parts continue



New CINCINNATI

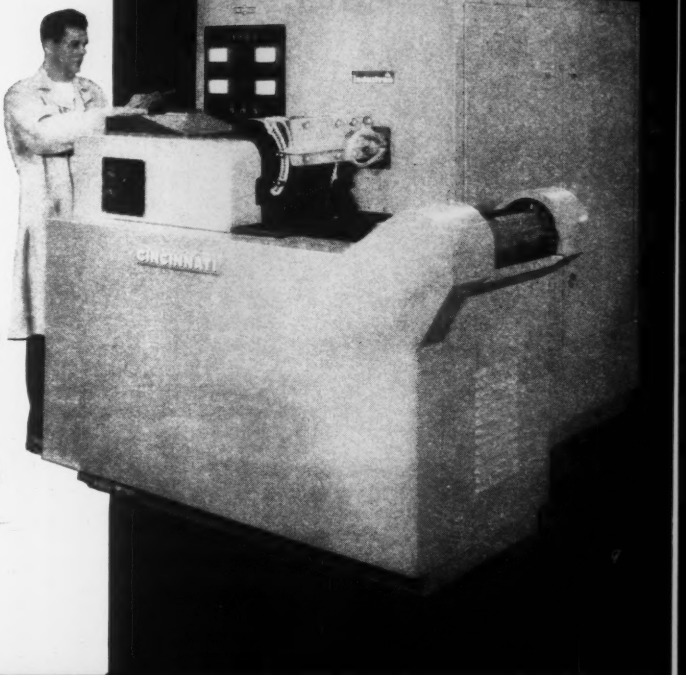
flamatic®

In production, the machine shown uses multiple fixtures for selective surface hardening *1000 automotive rocker arms per hour.*

which CINCINNATI meets your selective surface hardening needs?

Your product components that require heat processing—such as selective surface hardening, annealing, brazing, tempering—can be Cincinnati-processed at a savings! New and versatile Cincinnati flame or induction heating machines can do the work you specify—and meet your cost-per-piece requirements on high production quantities or varied, small-lot runs. Let a Process Machinery Division field engineer evaluate your needs. With the assistance of our extensive research laboratories and engineering facilities, he is ideally equipped to recommend the heat source and method that will be best and cheapest for you.

For machine descriptions and specifications, write for Flamatic Bulletin M-2015; Inductron Bulletin M-1993.



New CINCINNATI

inductron®

This machine induction hardens both ends of *automotive push rods at the rate of 3600 parts per hour.*

CINCINNATI

flamatic and inductron

hardening machines

PROCESS MACHINERY DIVISION

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

along the gravity track to the second stop position where they are rotated for proper orientation before entering the shuttle that elevates them.

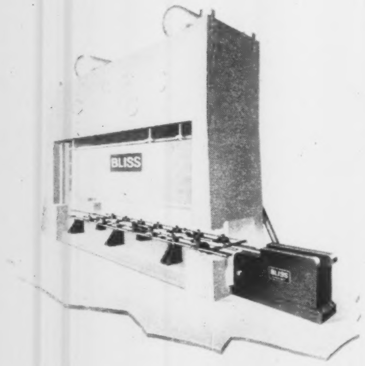
Elevator height, capacity, and feed rate can be adjusted to suit the application. *Write*: Gear-O-Mation Div., Michigan Tool Co., 7173 E. McNichols Rd., Detroit 12, Mich. *Phone*: Twinbrook 1-3111

Press Feeder

This self-contained transfer feed console converts straight side presses to automatic transfer feed drive operation.

The feeder can also be used to move material through a series of presses. It is operated through one power take-off from the press crank; or it may be powered independently and set up to control the press cycle.

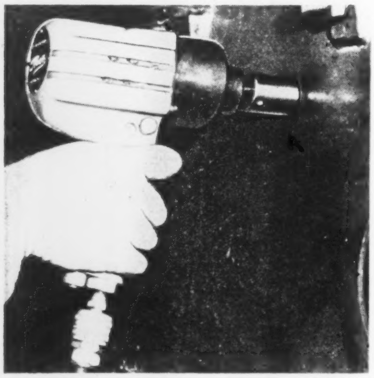
Aluminum feed rails are used to push or pull work through the press. Transfer fingers can be adjusted for straight or lifting operation.



The feed stroke can be adjusted from 15 to 30 in. in 1-in. increments. *Write*: E. W. Bliss Co., Canton, Ohio. *Phone*: 7-3421

Impact Wrench Is Light

Model 024 drives 3/8-in. bolts. It has a 1/2-in. square drive and is powered by air.



The wrench weighs 6 3/8 lb and is only 6 9/16 in. long. Free speed of the motor is 6000 rpm. *Write*: Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill. *Phone*: Aurora 2-7601

Dust Collector

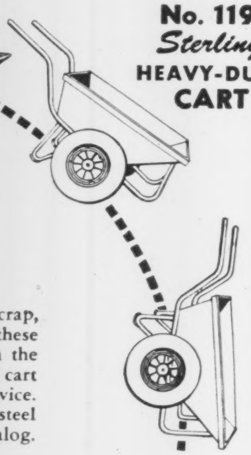
The Junior Cyclone DusKolector is for light and medium applications, including buffing, polishing, cast iron machining, and miscellaneous grinding.

Two models have capacities of 400 and 600 cfm. They operate on the principle of centrifugal precipitation; larger particles are removed by gravitation.

Large particles are deposited in a removable receptacle in the base. Small ones are exhausted outdoors or trapped in a bag attached to

Hammond of Kalamazoo
Hammond

YOUR BEST *Tip* IN CARTS



No. 119
Sterling
HEAVY-DUTY
CART

If you're looking for a good tip for wheeling coal, scrap, chips, turnings or similar heavy materials, see these Sterling Heavy Duty Carts. Over and over again the "3-Point Landing" feature of this well-balanced cart will convince you it's the best buy for years of service. Can be furnished with pneumatics, as shown, or steel wheels ... plain or roller bearings. Write for Catalog.

3 SIZES AVAILABLE:

No. 119	7½ cu. ft.
No. 120	9 cu. ft.
No. 121	11¼ cu. ft.

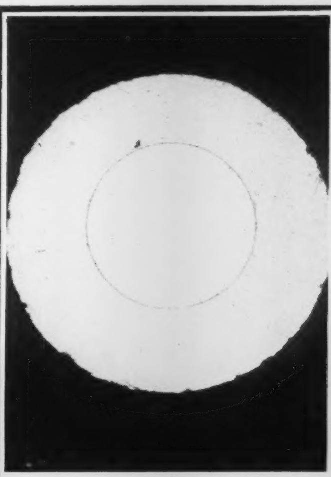
STERLING WHEELBARROW CO., Milwaukee 14, Wis.

A HALF CENTURY OF PROGRESS

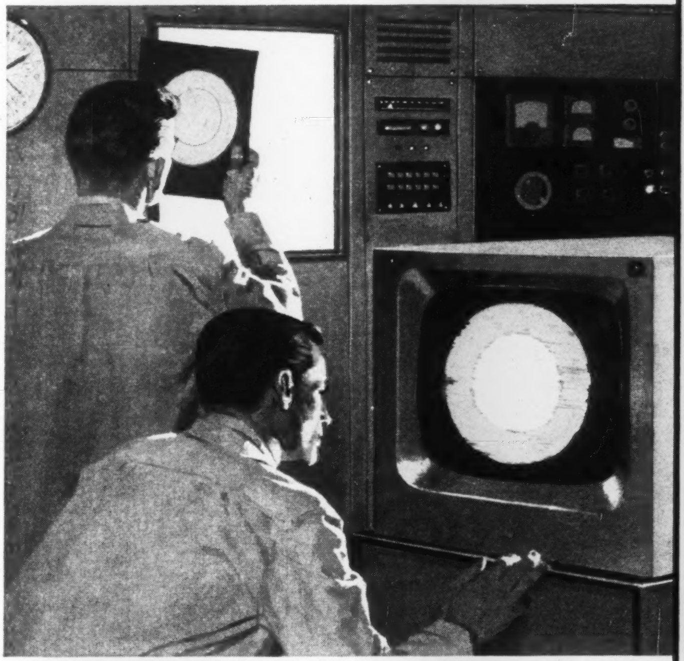
Look for this Mark of STERLING Quality

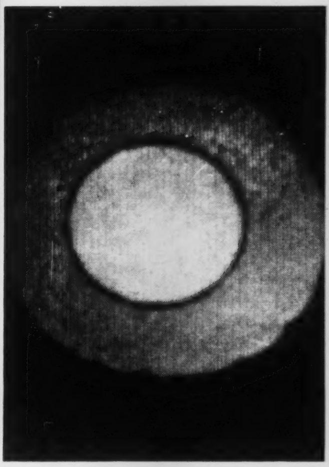
Sterling
WHEELBARROWS

DETECT HIDDEN FLAWS IN MATERIALS BEFORE YOU SPEND MONEY ON FINISHING!



Actual photograph of gray-scale test transparency, shown unenhanced.





The same transparency showing gray-scale contrast enhancement by EXICON.

New Philco EXICON dramatically improves gray-scale contrast on any photographic transparency.

EXICON is proving an invaluable new tool in metallurgy, quality control, stress analysis and countless industrial applications. This new dimension in contrast enhancement is finding application wherever greater detail is desired in the reading of any photographic negative. If you have a problem requiring contrast enhancement . . . Philco's new EXICON system may provide the answer.

Exicon®

At Philco, opportunities are unlimited in electronic and mechanical research and engineering.

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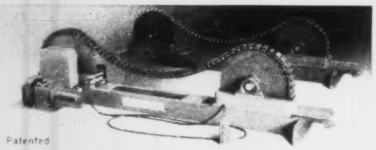
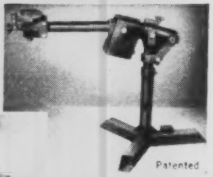
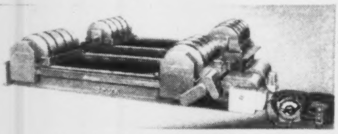

Patented

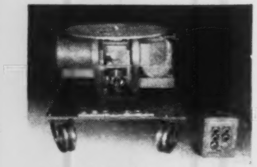
Aronson TracTred (T M Reg) Turning Rolls for thin-walled heavy cylindrical work to 27 tons capacity Zero to 100 IMP turning speed and Built-In Grounding.

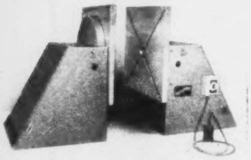

Aronson Universal Balance Positioners (T M Reg) position your weldments effectively, instantly for downhand welding. Capacities to 2000 lbs.

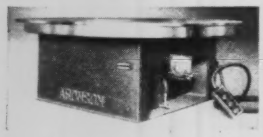
Patented

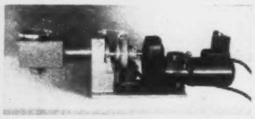

Heavy Duty Precision Built Rubber and Steel Tired Turning and Pipe Rolls, 100% overload protected Capacities to 300 Tons

Fully Automatic Gear Driven Positioners, featuring Geared Elevation. 135° Tilting and Variable or Constant Speed Rotation Capacities to 120,000 lbs


Model D Gear Driven Positioners Compact, Precise, Rugged Capacities to 1000 lbs


Rugged Head and Tail Stock for positioning bulky weldments between centers. Table Backup for Zero Deflection, Magnetic Braking. Capacities to 160,000 lbs.


Heavy Duty Floor Turntables with precision speed control and Magnetic Braking, used for welding, burning, X-raying, etc. Capacities to 120,000 lbs., various heights and speeds.

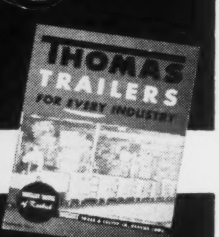

Bench Turntable Automatic Positioners with Mercury Grounding Capacities to 500 lbs.

Quality POSITIONERS by *Aronson* MACHINE COMPANY
ARCADE, NEW YORK

THOMAS TRAILERS

"JOB SUITED"
to your needs
in sizes from
1 to 60 tons

WRITE FOR
CATALOG NO. JT-53



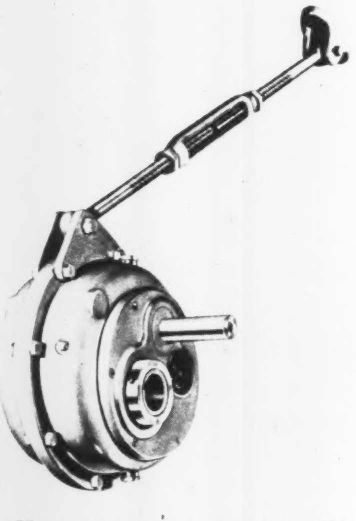
THOMAS TRUCK & CASTER CO.
818 Mississippi River • Keokuk, Iowa

THOMAS MAKES ALL KINDS OF TRUCKS, SKIDS, CASTERS AND WHEELS

the outlet. *Write*: Hammond Machinery Builders Inc., 1611 Douglas Ave., Kalamazoo, Mich. *Phone*: Fireside 5-7151

Gear Reducer

This shaft-mounted gear reducer comes in single and double reduction models. Single reduction types are 98 per cent efficient and have a nominal 4.5:1 speed ratio. Double reduction models are 96 per cent efficient and have a 14.7:1 speed ratio.

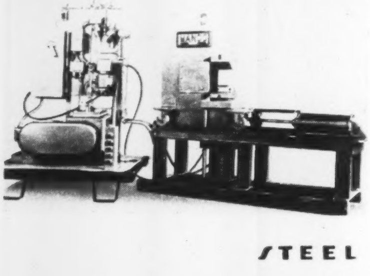


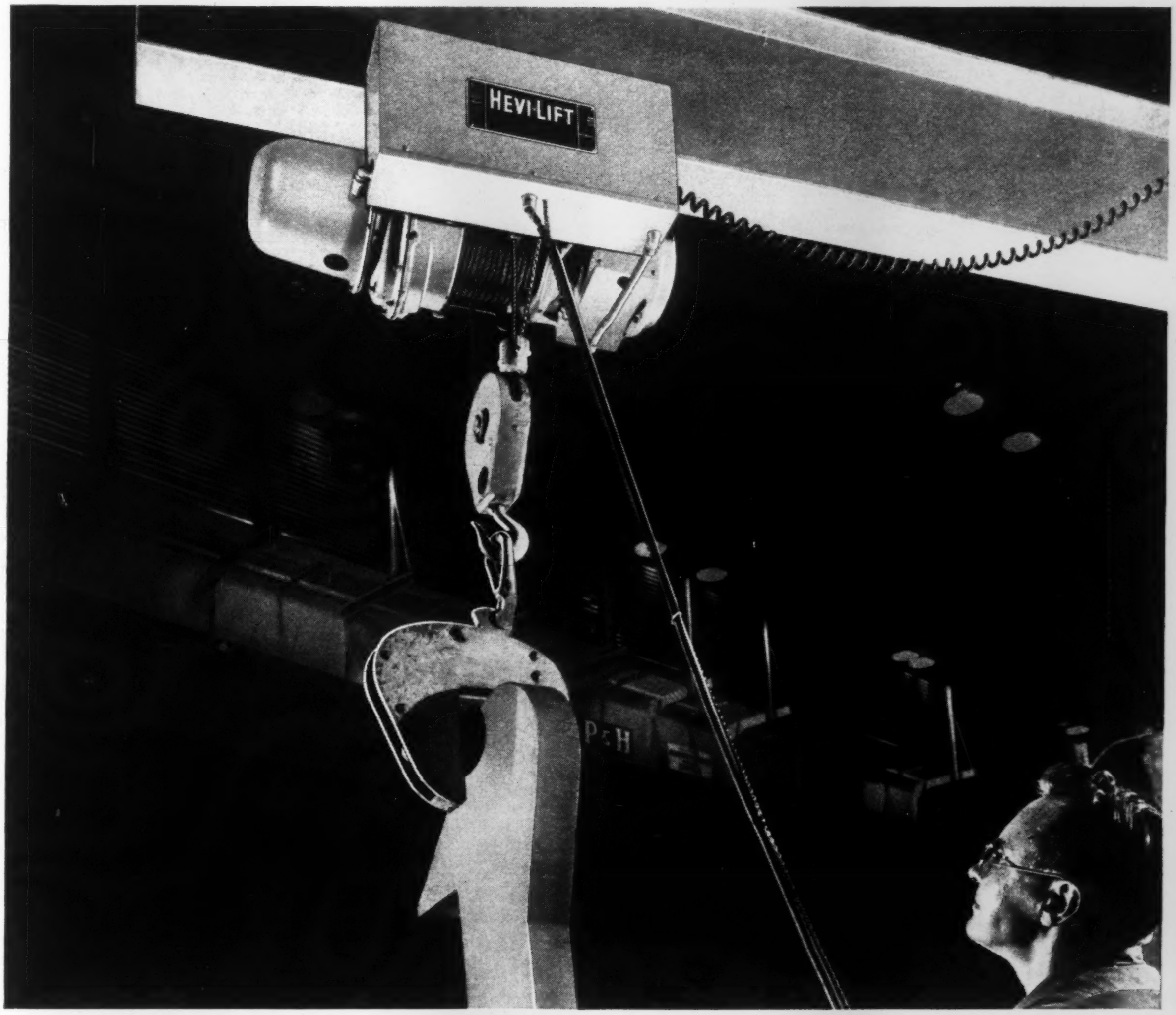
Horsepowers range up to 120, output speeds 8 to 425 rpm.

Reducers are easily installed direct to a driven shaft and can be mounted vertically or at any angle. *Write*: Lovejoy Flexible Coupling Co., 4975 W. Lake St., Chicago 44, Ill. *Phone*: Estebrook 9-3010

Billet Shear

Model MC-270 hydraulically shears stainless and medium carbon steel billets at temperatures from 1200 to 1600° F. The guillo-





P&H HEVI-LIFT Hoist

...the safest hoist built for your toughest lifting jobs

P&H HEVI-LIFT® (capacities from 1000 to 40,000 lbs.), gives you two-brake safety. One, the exclusive RCD, is the safest hoist brake built — uses the same principle as "mill-type" brakes found on big cranes. It has no linkage, no laminations, and only one simple point of adjustment. Brake movement is only 1/32 of an inch. The results: faster response for precise inching and spotting, and a 40% reduction in total hoist maintenance.

In addition, the other brake, a mechanical roller-and-ratchet type, gives *extra* assurance of positive safety.

Control interlocks and overload relays automatically protect the hoist against damage. Upper limit switch safeguards both the hoist and load, while the shrouded load block prevents injury to workers' hands.

Find out about these and other HEVI-LIFT advantages. Write for Bulletin H-5; Dept. 212E. Harnischfeger Corp., Milwaukee 46, Wisconsin.

HARNISCHFEGER

P&H ...quality and service for 74 years

Case histories prove

TM Triple-Safe ALLOY CHAIN

increases safety, cuts chain costs!

GAMMA RAY QUALITY CONTROL!

X-Ray type testing of master, joiner and end links assures safe, trouble-free welds.

CONTROLLED ATMOSPHERE HEAT-TREATING

on all popular sizes, provides uniformity throughout the sling assembly.

EXCLUSIVE, PATENTED TAYCO HOOKS!

I-Beam type design plus alloy steel construction mean extra safety, longer life!
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REGISTERED!
Certificate bears the chain's guarantee . . . proof test . . . serial number.

CERTIFICATE OF TEST

Contact your nearest Distributor or write
S. G. TAYLOR CHAIN CO., INC.
Plants: Box 509, Hammond, Indiana
3505 Smallman St., Pittsburgh 1, Pa.

Chain is our specialty, not our sideline!

TAYLOR MADE
A GREAT NAME IN
Chain SINCE 1873

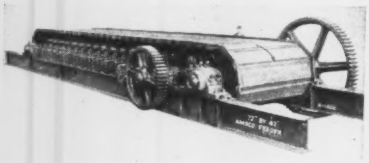
tine-type unit develops 70 tons of thrust at 5000 psi.

The shear makes a cut in 9 seconds and requires only 15 seconds for the complete cutting cycle. It has a capacity for 2½ x 3½ in. flat or rolled shapes.

A power traverse positions the head for cutting. *Write*: Manco Mfg. Co., Bradley, Ill. *Phone*: 3-8231

Ore Feeder

Amsco will move 550 tons of ore in an hour. A series of manganese steel pans carry copper ore from storage bins or hoppers to conveying and crushing facilities. The pans ride on the parallel endless chains also made of manganese steel.



The feeder is 72 in. wide, 20 ft high, and has 46-ft centers. It moves ore horizontally or on inclined planes. *Write*: Stephens-Adamson Mfg. Co., Aurora, Ill. *Phone*: Aurora 2-4311

Scales Print Data

The Printweigh 400s record data (including time and date) on office forms or tickets as large as 8½ x 11 in.

The scales have a "memory." Even after the load is removed from the platform, information is recorded at the scale or a remote location. Another load can be placed on the platform without affecting stored data.

Digital weight data can be transmitted to remote units, such as adding machines and tabular tape punches.

A complete weight figure is always printed, even when unit weights which increase dial capacity are used. Selective numbers can be used.

Printing is fast; only one coding disc is used. Except at the instant the weight is recorded, there is no

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a name with over 83 years experience ready to serve the industry at all times with the

PERFORATED

requirements necessary for your equipment, machinery or parts in any form or types of

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or fibre, cardboard, paper, soundboards and other materials in a workmanlike manner that

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lasting performance, better quality, and above all a product that will give you a

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job for the particular purpose for which it is to be used, without defects, burrs or camber to

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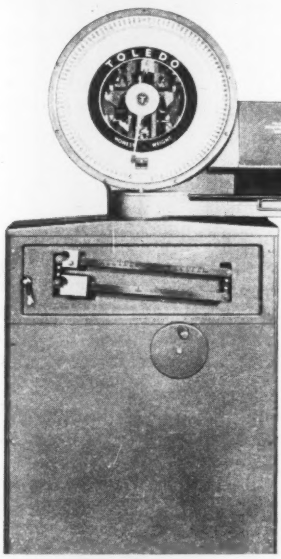
Send for Illustrated Catalog



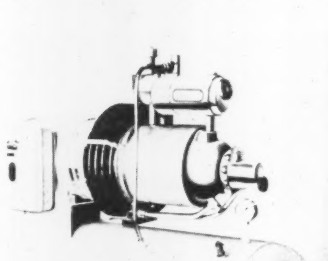
contact between the weighing and printing mechanism. Sizes range from portable and bench models to motor truck scales. *Write*: Toledo Scale Div., Toledo Scale Co., Toledo 13, Ohio. *Phone*: Kingwood 5441

Rotary Compressors

This line of tank-mounted compressors comes in 2, 3, and 5-hp models. They operate at 100 and 200 psi.

The Hydrovane Rotary units are free from vibration and operate quietly. They do not require special compressor rooms or foundations.

Vertical and horizontal tank



ALL-HYDRAULIC!

SILENT HOIST KRANE KAR

HYDRAULIC
Boom Swinging
Boom Topping
Boom Telescoping
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Originator and leader in its class for 30 years, KRANE KAR goes ALL-HYDRAULIC. Affords amazing ease of handling . . . touch control of all crane operations . . . with other engineering advances that simplify operator's work . . . eliminating gear shifting and clutch replacements . . . cutting maintenance to the bone and setting new standards of efficiency and productivity. Get the details. *Sold and Serviced by Responsible, Well-Equipped Distributors*

FLUID DRIVE
POWER STEERING

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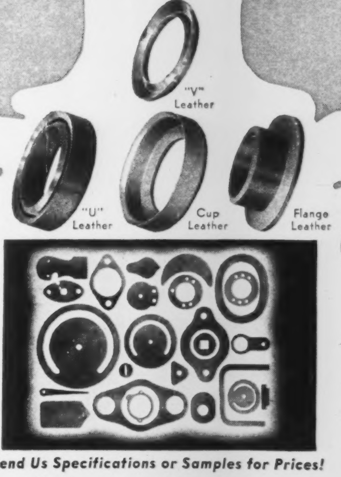
MODELS 1000 TO 25,000 LBS. CAP.

SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
849 63rd Street, Brooklyn 20, N. Y.



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X-L Brand MECHANICAL LEATHERS

Nothing takes the place of Leather!

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ROCKFORD, ILLINOIS

SO BRIGHT—Use *Brytite* wherever a shinier, brighter zinc coating is desired for long lasting, more sparkling product appearance. Eliminate polishing and special finishing operations

SO TIGHT—Brytite has remarkable forming qualities. The zinc coating is so tight it will withstand severe deformation of the base metal without flaking, powdering or peeling.

SO CLEAN AND SMOOTH—Satin smooth in looks and feel, BRYTITE immediately raises the quality appeal of your product. You get smoother production, too—the result of precise uniformity and quality controls.

ROUND AND SPECIAL SHAPES—*Brytite* is available in many sizes in round wire, and may on inquiry, be furnished in standard and special shapes—flat, half-round, oval, half-oval, square, rectangular, and many others.

a bright new wire with a brighter tighter finish

Brytite

A PATENTED GALVANIZING PROCESS ®

TEMPERS AND ANALYSES—Specify BRYTITE in various tempers and analyses in the low carbon and medium low carbon steels.

FINISHES—Satin Finish, Unwiped (where a heavy weight of zinc coating is required) and Redrawn, in certain sizes.

no polishing...no buffing...no finishing...

Egg Baskets

Bottle Carriers

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withstands difficult forming operations

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CORPORATION · KOKOMO, INDIANA

PRODUCERS OF Manufacturer's Wire in many sizes, tempers and finishes, including Galvanized, KOKOTE, BRYTITE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, and special shaped wire. Also Welded Wire Reinforcing Fabric, Nails, Continental Chain Link Fence and other products.

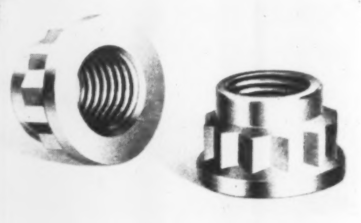
mountings are available.

Modulation, start-stop, or combination modulation and start-stop unloading mechanisms can be obtained. *Write*: Industrial Div., Davey Compressor Co., Kent, Ohio. *Phone*: Orchard 3-3471

Aircraft Nut Is Light

This 12-point Flexco 42 FLW is used for critical airframe fastening applications. Rated at 180,000 psi minimum tensile strength, it is self-locking. Diameters are 1/4 to 1/2 in.

The nuts are made of alloy steel and are rated for temperatures up to 550° F.

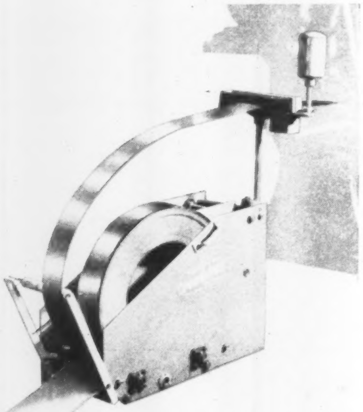


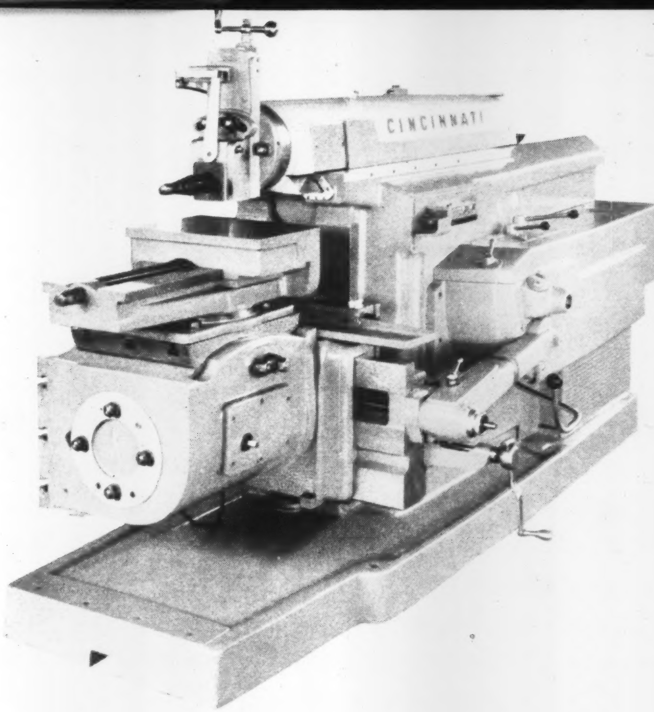
A solid locking collar is squeezed inward in three places to provide vibrationproof locking action. *Write*: Advertising Dept., Standard Pressed Steel Co., Box 579, Jenkintown, Pa. *Phone*: Turner 4-7300

Coil Cradle

The Poweroll coil cradle can handle stock up to 25 in. wide and 48 in. in diameter. Maximum weight is 3000 lb.

The complete coil cradle and





Cincinnati standard features: extra savings at no extra cost

Cincinnati Shapers give you so many money-saving features per dollar invested that they can be the most profitable equipment in your shop.

1. This 2″ cut, .030″ feed, demonstrates the ability of the 50 psi automatic lubrication system to maintain oil films under heavy leads.

2. Brushless electromagnetic brake and clutch insure fast, easy operation. No adjustment is required.

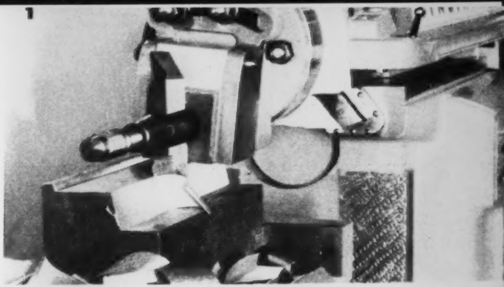
3. Both vertical and horizontal rapid traverse are standard Cincinnati features which substantially reduce setup and cutting time.

4. Extended ramway bearings increase ram support and minimize wear. Full table clearance to the column gets work closer to the column, minimizes overhang.

5. The vee ramways are integrally cast with the column. Ramway rigidity is increased by eliminating joints. Full length tapered gib provides for easy adjustment, maintains accuracy.

Write Dept. C for Bulletin "Cincinnati Rigid Shapers."

1



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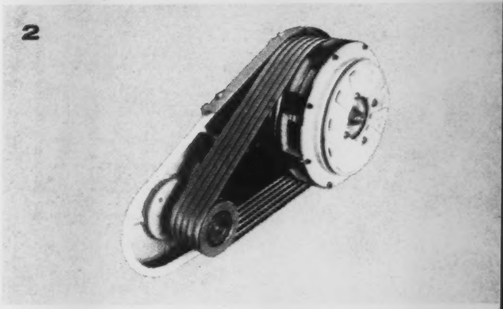

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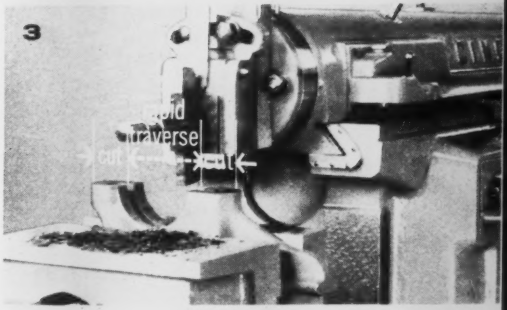

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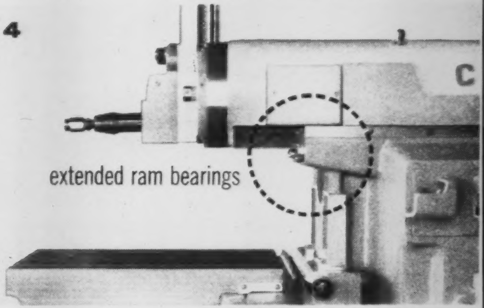

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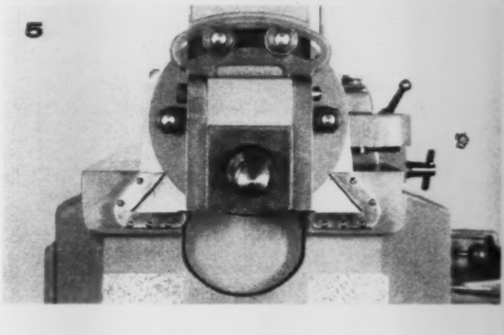
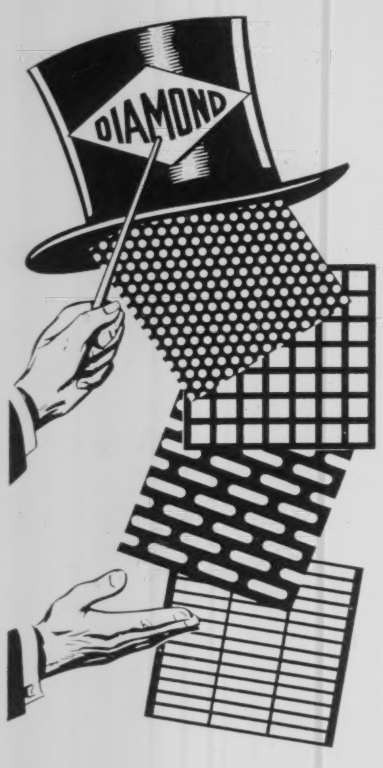


Shapers / Shears / Press Brakes

THE CINCINNATI SHAPER CO.

Cincinnati 11, Ohio



Top-Hat Quality IN Perforated Metal

The popular Diamond Perforated-metal patterns shown above are only a few of the many illustrated and described in our 32-page Catalog No. 39. All of these standard patterns are available in a wide range of unit-opening sizes and we are always equally pleased to quote on original designs of any type or size.

Catalog 39 also illustrates and describes our high-quality lines of *Ornamental Cane*, Perforated-Metal Sheets for Accoustical installations and Heavy-Duty Architectural Grilles. Write, today, for a free copy.

Correspondence is especially invited regarding ANY requirement for perforated-metal panels or parts. We are equipped to fabricate special sections to any desired extent and welcome opportunities to make money-saving suggestions.

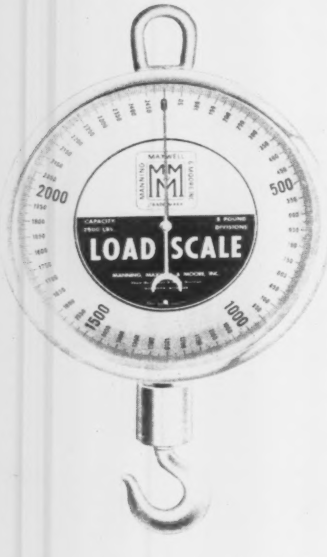
DIAMOND MFG. CO.
WYOMING WILKES-BARRE AREA **PA.**
West Coast Plant,
DIAMOND PERFORATED METALS CO.
17915 So. Figueroa St., Gardena, California
Los Angeles Area

oiler unit can easily be moved from one press to another. It provides an automatic slack loop and cleans and oils the stock.

One man can load the unit without using a crane or hoist. *Write*: Medelton Co. Inc., 335 E. 142nd St., Bronx 54, N. Y. *Phone*: Ludlow 5-4343

Load Scales

Weighing and handling are done in one operation. Accuracy is within 0.2 per cent of the full scale loading.

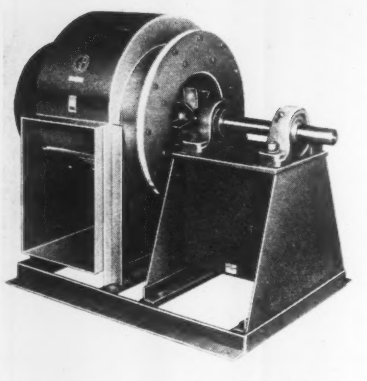


The mechanism is sensitive to weight changes of less than one-half of a division. Normal temperatures do not affect its operation. *Write*: Manning, Maxwell & Moore Inc., Muskegon, Mich. *Phone*: 3-1311

Heat Fans

Dura-Temp heat fans will handle temperatures up to 1650° F. The bearings are kept in cool operating zones. High temperatures inside the fan cannot reach the bearings and cause trouble: A rotating member fitted to the shaft radiates and circulates ambient heat away from the bearing areas. It's made of a dissimilar alloy.

Fans in the line will move from 600 to 30,000 cfm. *Write*: Dept. H, General Blower Co., 8611 Ferris Ave., Morton Grove, Ill. *Phone*: Orchard 4-1414



Brazing Control

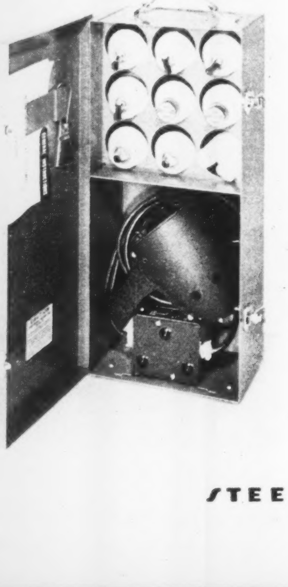
White Stop-Off is a parting compound that prevents the joining of mating surfaces during furnace brazing.

The material comes in a powdered form which is mixed with a volatile plastic to make it easy to apply.

The compound will prevent the brazing or fusion of any surface. It may be applied by brushing, dipping, or spraying. *Write*: Stainless Processing Div., Wall Colmonoy Corp., 19345 John R St., Detroit 3, Mich. *Phone*: Twinbrook 3-3800

Inspection Kit

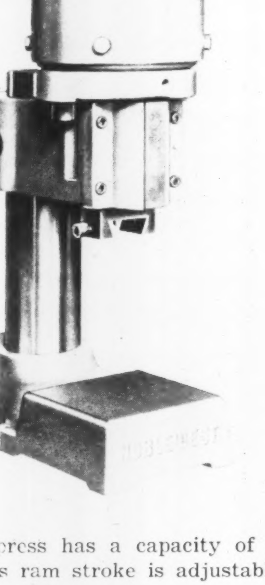
This fluorescent penetrant inspection kit is portable. It can be used to locate cracks, pores, leaks, and other defects open to the surface in any solid material.



The kit contains pressurized spray cans of cleaner, Zyglo penetrant, developer, a 100-watt black light, cleaning cloths, and instructions. *Write*: Magnaflux Corp., 7300 W. Lawrence Ave., Chicago 31, Ill. *Phone*: Underhill 7-8000

Bench Press

Model 491 is an air-operated press for marking operations, light staking, dimpling, punching, bending, and related operations.



The press has a capacity of 1 ton. Its ram stroke is adjustable up to 1 in.

A three-way air valve operates the press. *Write*: Noble & Westbrook Mfg. Co., East Hartford, Conn. *Phone*: Butler 9-2717

Grinding Wheels

This line of vitrified grinding wheels comes in standard diameters from 3 to 42 in. Special sizes and shapes are available.

Precision kiln equipment is used during manufacture. *Write*: Sales Promotion Dept., Simonds Worden White Co., 1101 Negley Place, Dayton 7, Ohio. *Phone*: Crestview 4-2106

Coating for Plating Racks

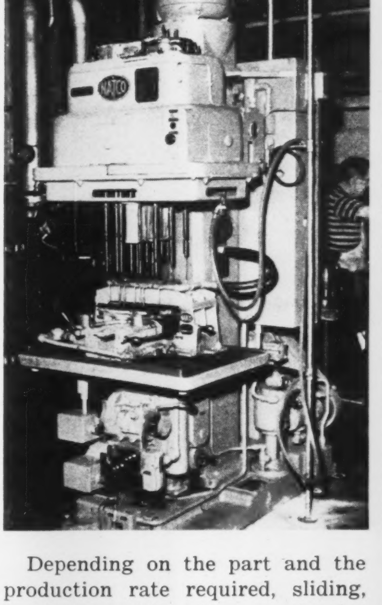
Electroplating racks are insulated from metal plating by Crystal-Clear, a protective coating.

Insulating the racks (except where they make contact with the cathode bus bar and the pieces to be plated) directs all of the current to the pieces to be plated.

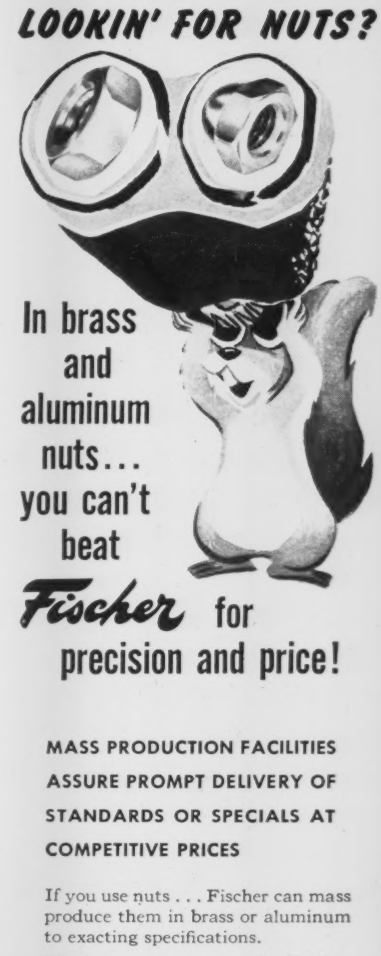
Because the rack is not plated, metal is saved and the racks can be used longer. *Write*: Krylon Inc., 18 W. Airy St., Norristown, Pa. *Phone*: Broadway 9-1950

Multiple Spindle Drill

Model H-6 has 24 adjustable spindles which accurately locate holes and eliminate the use of jigs. Controlled feed rates are used to increase tool life.



Depending on the part and the production rate required, sliding, multiple position, box, or circular type fixtures can be used. *Write*: National Automatic Tool Co. Inc., Richmond, Ind. *Phone*: 2-1183



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In brass and aluminum nuts... you can't beat Fischer for precision and price!

MASS PRODUCTION FACILITIES ASSURE PROMPT DELIVERY OF STANDARDS OR SPECIALS AT COMPETITIVE PRICES

If you use nuts . . . Fischer can mass produce them in brass or aluminum to exacting specifications.

Uniform accuracy of Fischer "turned" nuts permits new savings in assembly or fabricating operations. Produced by unique high-speed machinery, Fischer precision nuts cost no more than those made by less accurate methods.

Fischer nuts are countersunk on both sides, tapped square with face to Class 2 tolerances, burrless, cleaned, degreased and carefully inspected before delivery.

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Please send me your new 20-page CATALOG FS-1000 describing Fischer precision nuts.
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NEW Literature

Write directly to the company for a copy

Thread Comparators

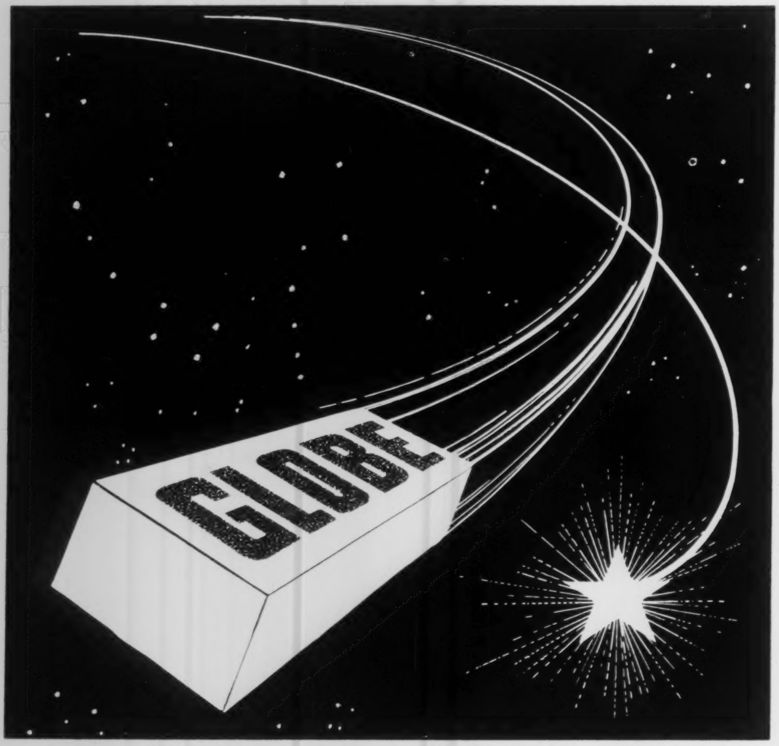
This 12-page bulletin covers standard and dual thread external comparators and internal comparators. Attachments for checking squareness and concentricity are also described. Hanson-Whitney Co., division of Whitney Chain Co., 169 Bartholomew Ave., Hartford 2, Conn.

Springs

This 8-page bulletin tells how to design and select materials for springs that must operate at high temperatures. Associated Spring Corp., Bristol, Conn.

Transformers and Rectifiers

Design and construction of transformers are covered in Bulletin 61B6186C, 20 pages. Germanium, silicon, and selenium semiconductor rectifiers with conversion efficiencies up to 95 per cent are described in Bulletin 12B8897, 4 pages. Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.



ANY GLOBE SUPERIOR LADLE BRICK

could survive the heat that destroys a shooting star

SERVING THE STEEL INDUSTRY SINCE 1873 ★

This greater heat resistance is one of the reasons why GLOBE BRICK lasts longer. There is a type for every need of ladle lining. We offer quality and service, so help yourself to some of the wisdom we've gained in 85 years of service to the steel industry.

The GLOBE BRICK Co.
EAST LIVERPOOL, OHIO

Metallurgical Microscope

This 8-page bulletin describes an easy-to-use tool for photomicrography of metal specimens. Instrument Div., American Optical Co., Buffalo 15, N. Y.

Gears

Bulletin PG-100, 6 pages, covers a line of precision gears, commercial gears, speed reducers, and motorized reducers. Grant Gear Works Inc., 154 W. Second St., Boston 27, Mass.

Die Springs

Bulletin 70-A, Section 4, 12 pages, lists die springs in 500 standard sizes and three pressure groups. Die Supply Div., E. W. Bliss Co., 1400 Brookpark Rd., Cleveland 9, Ohio.

Silent Chain Drives

This 88-page book, 2425, details engineering data of a chain with an efficiency better than 98 per cent. Tables cover service factors, ratings, chain length, and center distance computations. Pre-engineered stock drives are listed and the procedure for the selection of drives is outlined. Dept. PR, Link-Belt Co., Prudential Plaza, Chicago 1, Ill.

Drills, Reamers, End Mills

Catalog 58, 96 pages, covers carbon steel, cobalt steel, and high speed steel drills; arbors, reamers, and countersinks; various types of multiple flute, two flute, and two-lipped end mills. Other information includes technical data on drilling, drill grinding, feeds, and decimal and metric equivalents. Greenfield Tap & Die Corp., Greenfield, Mass.

Welding Supplies

Catalog 9-13, 48 pages, covers ferrous and nonferrous welding rods for oxyacetylene welding and Heliwelding, fluxes and their uses, silver brazing alloys, protective equipment, electrode holders and cable connectors, weld cleaning tools, and twin and single line hoses. Air Reduction Sales Co., division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

Industrial Heaters

Bulletin 750A, 26 pages, details the operation of a heating and ventilating unit for supplying make-up air or a plant heat load. Thirteen

SPECIAL STEELS*

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When service counts, you can count on Ingersoll for a wide variety of special purpose steels.* Being a specialty mill, Ingersoll offers great flexibility in production scheduling, set up to fit your own requirements. Ingersoll's advantageous location at New Castle, Indiana assures prompt deliveries. And Ingersoll's modern quality-control facilities mean dependably uniform high quality from one order to the next. On all these counts, it will profit you to consult Ingersoll—a good name to know, a good place to go for the special steels you need.

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Ingersoll STEEL DIVISION
Borg-Warner Corporation
New Castle, Indiana

NEW LITERATURE . . .

performance graphs and charts cover steam capacities, air flow resistance, and other air flow data. Dept. PD, American Air Filter Co. Inc., 215 Central Ave., Louisville 8, Ky.

Aircraft Fasteners

Bulletin 8-415, 12 pages, describes fasteners, blind rivets, and driving tools. Huck Mfg. Co., 2480 Bellevue Ave., Detroit 7, Mich.

Brushes

This 8-page bulletin describes brushes for cleaning chips, dirt, scale, removing burrs, metal fuzz, and other excess material from metallic and nonmetallic parts. Advertising & Sales Promotion, Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland 14, Ohio.

Press Line

C-type and straight side presses with ball bearing ram raceways are described in Bulletin AFP-101, 8 pages. Precision Welder & Flexopress Corp., 3520 Ibsen Ave., Cincinnati, Ohio.

Metal Powder

This 8-page publication list includes standards, technical papers, and data sheets. Metal Powder Association, 130 W. 42nd St., New York 36, N. Y.

Gear Sets

A line of worm gearing, supplied in individually matched sets, which provides high load carrying capacity on small center distances, is described in Bulletin 700-C, 16 pages. Cone-Drive Gears Div., Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich.

Steel Buildings

Bulletin SX-13757, 8 pages, describes buildings made of interlocking steel panels. Product Information Service, Armco Drainage & Metal Products Inc., Middletown, Ohio.

Welding Press

Here's information on a press used with several types of resistance welding, including multispot, multiprojection, brazing multicross, or mash. Combined Welder & Machine Corp., 73-40 Grand Ave., Maspeth 78, N. Y.

Tool Alloy

Bulletin 573, 12 pages, tells where and how to use a cast alloy of cobalt, chromium, tungsten, columbium, and carbon in the form of solid tools bits, tipped tools, cutoff blades, toolholder inserts, and preformed tools and blanks. Vascoloy-Ramet Corp., Waukegan, Ill.

Conveyor Installation

Bulletin 500, 20 pages, tells how to plan and install power belt and gravity conveyors. Conveyor Dept., A. B. Farquhar Div., Oliver Corp., York, Pa.

Material Handling

This bulletin includes: Data on accessories for speeding material handling operations; solutions to handling problems involving different type loads in a variety of industries; and a description of a line of fork lift trucks and material carriers. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio.

Rubber Gloves

Bulletin 1310-2, 8 pages, describes gloves made of molded rubber and synthetic materials. It also rates their resistance to nearly 200 chemicals. Mine Safety Appliances Co., 201 N. Braddock Ave., Pittsburgh 8, Pa.

Steel Shell Molding

Bulletin 6, 4 pages, tells how fosterite grains, a highly-refractory magnesium silicate, improves the quality of steel castings made in resin-bonded shell molds. Harbison-Walker Refractories Co., Farmers Bank Bldg., Pittsburgh 22, Pa.

WEBB PLATE FABRICATING MACHINERY

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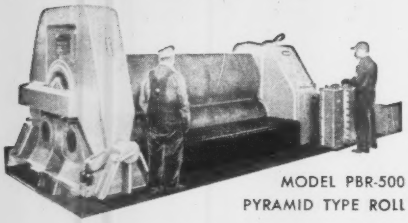
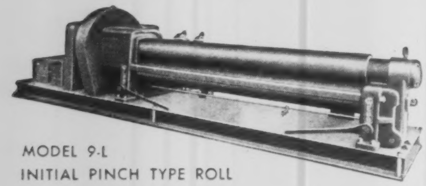
The Webb Corporation offers a complete line of Plate Bending Rolls for the rolling of the thinnest plate up to plate 2½" thick. Offered in a variety of lengths and thicknesses. Constructed for the modern fabricating shop.


MODEL PBR-500
PYRAMID TYPE ROLL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Two types available: the Initial Pinch Type and Pyramid Type machines. All latest advantages of today's modern machine tools are incorporated, utilizing anti-friction bearings, totally enclosed gear drives. Special forming rolls for culvert pipe, stock tanks and other special shapes available.

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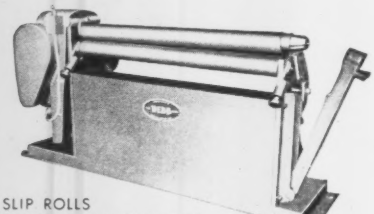
A complete line of small Sheet Metal Forming Rolls are also available. All power-driven with shaft sizes 3" to 5" for the handling of the thinnest gauge material, up to 8 gauge material. Special rolls for the forming of polished sheets, aluminum and stainless steels can be furnished. Complete catalogues on any size machine furnished upon request; write Dept. **D.**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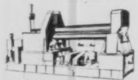
Let Speed PAY–The WEBB Way!

SLIP ROLLS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INITIAL TYPE ROLL

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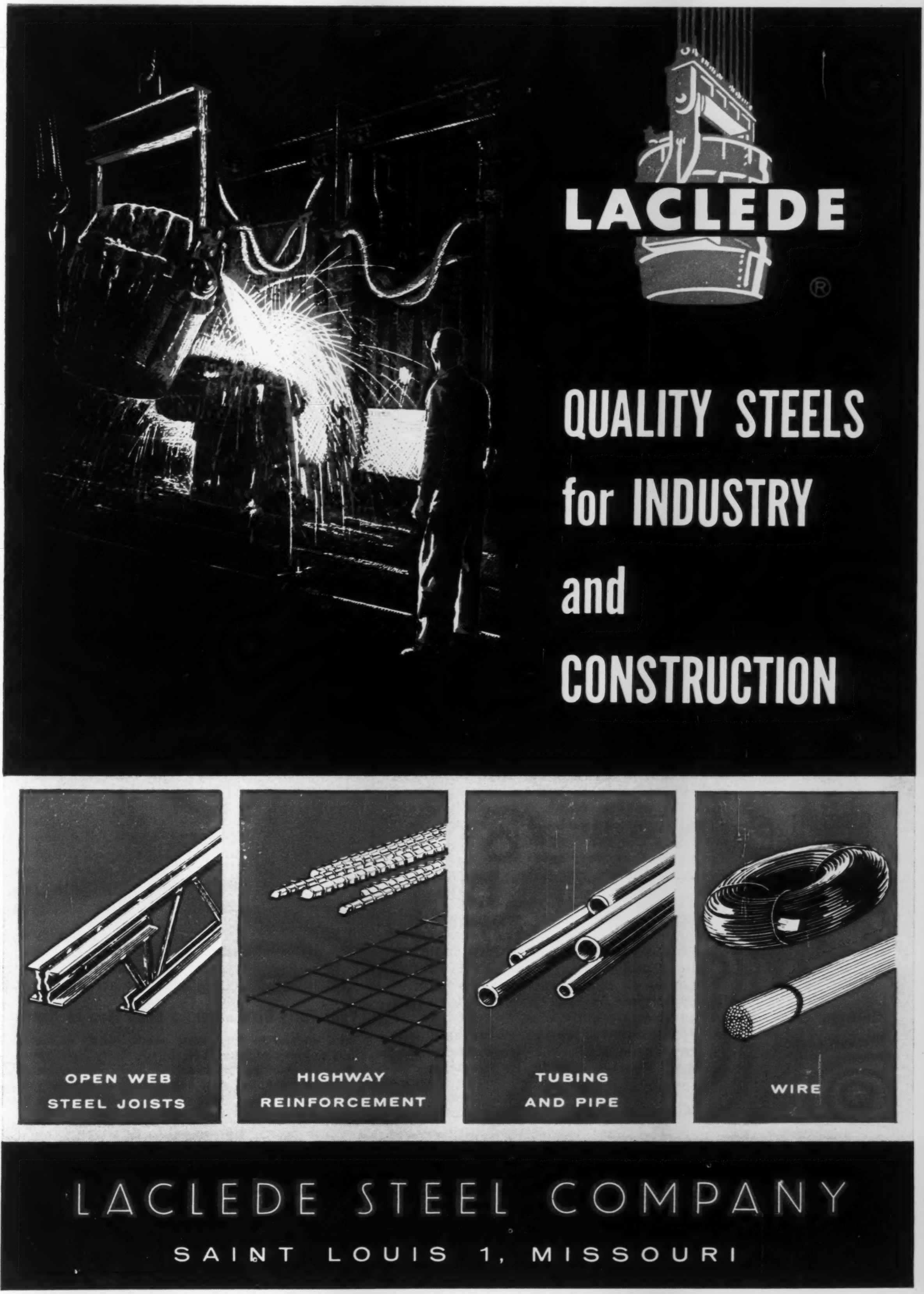
WEBB CITY, MO., U. S. A.



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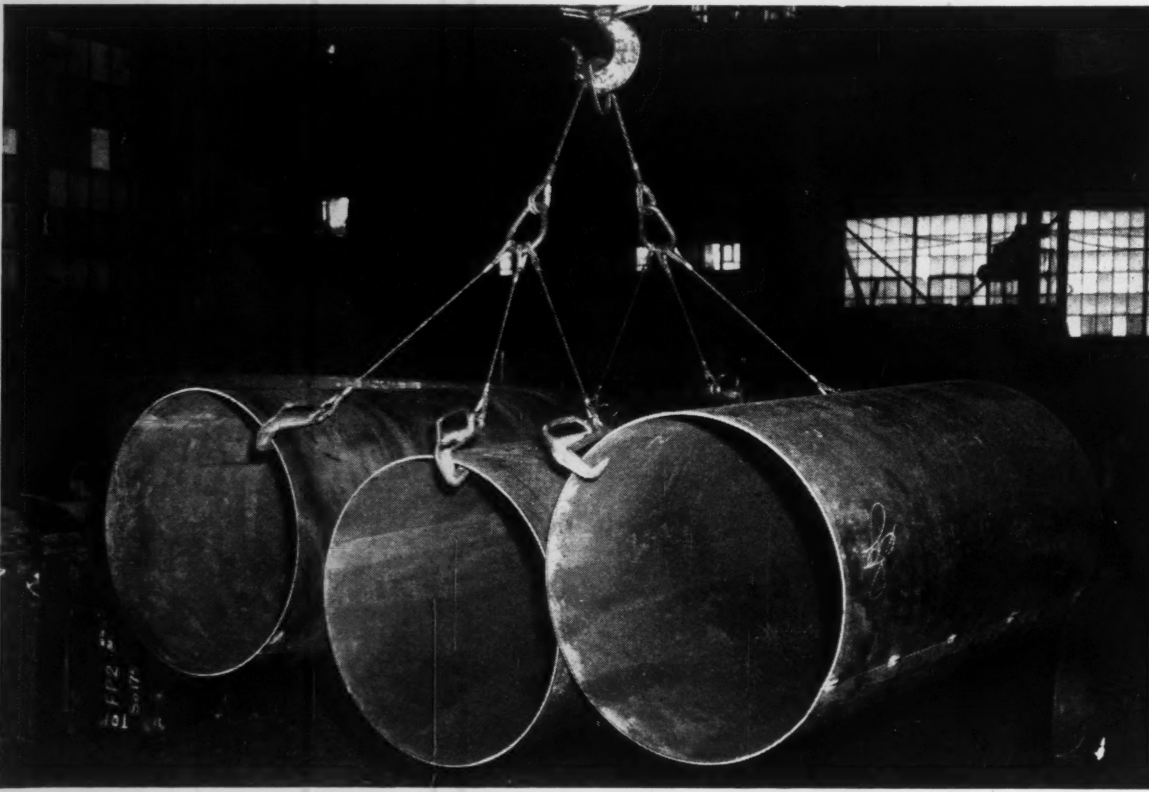

Tuffy®

Slings and Hoist Lines

now...thanks to Tuffy...three make the trip instead of one

The Toronto Iron Works makes tanks on a production line basis. Plate steel is rolled and welded into 8′-long tank sections at one end of the plant. The sections are picked up by an overhead crane and transported to the far end for final assembly. Formerly they were carried on a chain . . . a single section per trip, tying up the crane all day.

In the course of a plant survey, which is a valuable part of the service rendered by Tuffy distributors, a better idea came up. Why not make a rigging of Tuffy Slings . . . handle all three sections of a tank at the same time . . . free the crane for other work? That's exactly what is happening in the picture above. Result: easier handling, ⅔ less crane time, big production-dollar savings. Further result, in the words of a company official:

"This was the first time this plant used Tuffy Slings. Now they have standardized on them."

Tuffy Slings are ideal for this job (and countless others) because of their superb combination of super-strength and free-flowing flexibility. It's just about impossible to kink a Tuffy Sling; and if you should, the kinks smooth out with no damage done.

Another Tuffy plus feature: Tuffy's pressed-on ferrule is applied over tuck splices under tremendous pressure to give the sling eye 100% of fabric strength.

Your Tuffy Distributor: a Good Man to Know

He's stocked to meet your needs; ready to make fast delivery of your Tuffy Slings, Tuffy Hoist Lines (famous working partners of Tuffy Slings), and Union Wire Rope. And he's qualified to help you find money-saving ways of using Tuffy products in your operation. Get in touch with him.

Tuffy Sling
HANDBOOK

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Gives full data on Tuffy Sling types, uses, dimensions, weights and rated loads. Plus a complete rigger's manual and engineer's handbook on wire rope constructions and specifications. Write for your copy now.

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Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

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**for every wheel
that turns in industry**

Lubricating oils, cutting oils, multi-purpose greases, greases for spraying . . . whatever your needs, Atlantic has the lubricant to help you. Atlantic lubricants insure maximum lubricating performance at low cost for every job in the plant . . . for every wheel that turns in industry.

For lubricating products that fit your specific needs, or for expert assistance with your lubricating problems, write or wire any of these Atlantic offices.

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of Brazil** Rio de Janeiro, Brazil

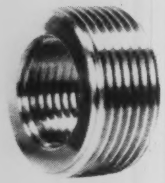
ATLANTIC

**LUBRICANTS · WAXES
PROCESS PRODUCTS**

Hand Your Deburring and Finishing Problems to

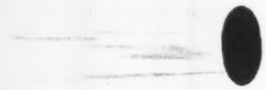
ALMCO...

**These companies did...
and cut costs, improved quality, increased production.**



DEBURRING of spark plug bushings by hand formerly caused many rejects at Canadian Pratt and Whitney. Costs were $104.20 per M with rejects totalling 12½%. Two Almco barrel finishing machines cut costs 97%, practically eliminated rejects.

SMALL GREASE GUN COUPLER JAWS (½" x ⅜") couldn't be deburred manually at a midwest screw products firm. With an Almco barrel finishing machine, 40,000 coupler jaws can now be deburred in 10 hours. Jaws are smooth, uniform, ready for plating.



DEBURRING AND POLISHING by manual methods proved expensive for delicate instrument and fountain pen parts at J. Bishop & Co. Almco barrel finishing machine increased output from 200 to 6000 parts per hour, cut costs 98.8%. Annual savings: $6,917.50.

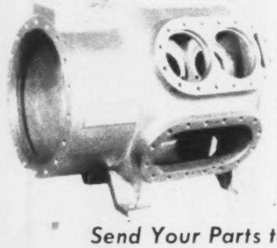
INCREASED PRODUCTION quotas demanded faster finishing at Alco Valve Co. Hand deburring and polishing finished only 200 stainless steel parts per hour. Almco machines are now barrel finishing over 1400 per hour, and to stricter finishing specs. Plant production needs are easily filled.

FILING burrs by hand formerly cost $55 per 100 needle plate forgings at Landis Machine Co. Now an Almco barrel finishing machine has cut finishing costs to 55 cents per 100 parts. Parts are uniform, rejects are eliminated. Savings come to 99%!

HEAVY WORK LOADS of roller bearings presented serious finishing problems at Timken's Columbus, Ohio plant. Now special heavy-duty Almco barrel finishing machines are processing two tons of rollers per load. And 50% of floor space has been saved, finishing costs have been slashed.

Large Parts too are Almco Barrel Finished!

AT AN IOWA FOUNDRY, an Almco barrel finishing machine deburrs, polishes 48 large wash machine agitators per hour. Fixtures hold castings firmly within Almco barrel. Rough edges are completely removed; castings are highly polished; appearance is improved.



AT AIR CONDITIONING FIRM, compressor housings weighing over 100 lbs. are Almco barrel finished. Almco process breaks sharp edges of castings, cleans internal surfaces, and improves surface finishes. Two housings are cleaned in 20 minute cycle! Workmen are relieved for other plant tasks!

Send Your Parts to Almco's Modern Test Laboratory.

Sample parts processed without obligation. Simply write on letterhead, sending parts direct to Albert Lea, enclosing specifications required. Complete, free report includes recommendation. 52 PAGE HANDBOOK ON BARREL FINISHING SENT ON REQUEST.

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151 Marshall Street • Albert Lea, Minnesota
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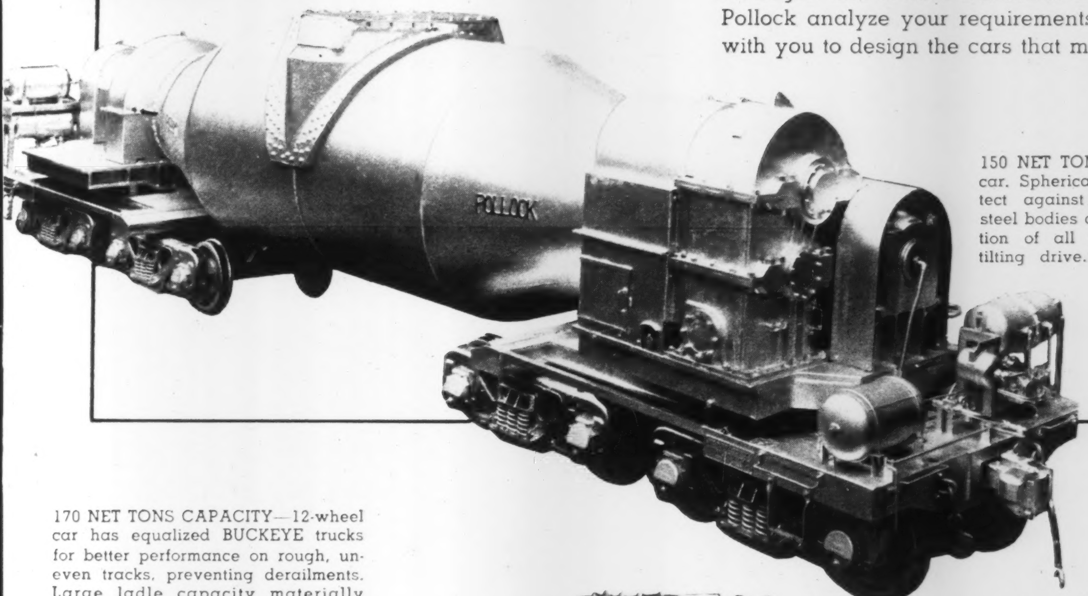
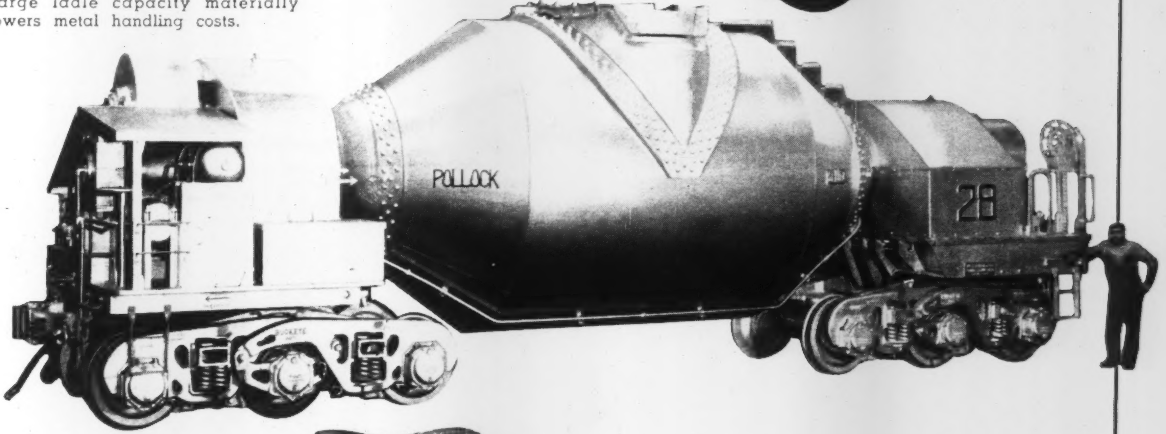
POLLOCK hot metal cars

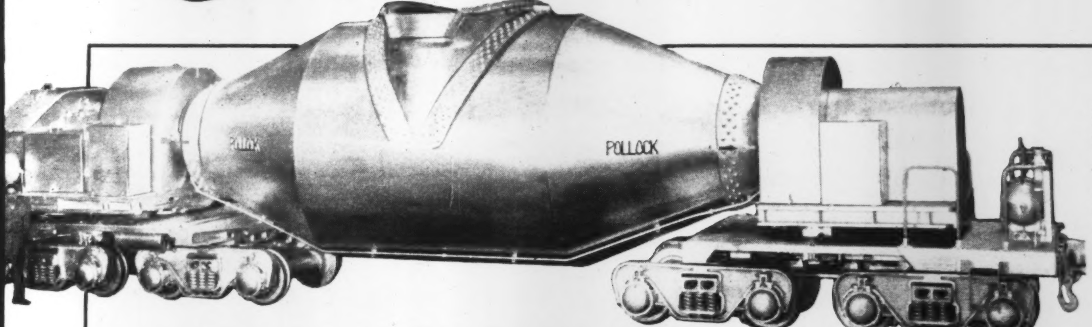
These are America's newest, BIG, hot metal cars. Pollock designed and built this type car to carry large tonnages and reduce hot metal handling costs. Have Pollock analyze your requirements. Pollock will work with you to design the cars that meet your needs best.



150 NET TONS CAPACITY—16-wheel car. Spherical trunnion bearings protect against misalignment. Welded steel bodies and ladles. Pump lubrication of all gears and bearings in tilting drive.

170 NET TONS CAPACITY—12-wheel car has equalized BUCKEYE trucks for better performance on rough, uneven tracks, preventing derailments. Large ladle capacity materially lowers metal handling costs.





200 NET TONS CAPACITY—America's largest. Dumping mechanism is completely covered. Car designed to meet specific plant conditions. Air brakes if desired.

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SINCE 1863

THE WILLIAM B. POLLOCK COMPANY
YOUNGSTOWN, OHIO

Associated in Great Britain with Ashmore, Benson, Pease & Co.

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Why is he asked?

Because the *advertisers* (whose money is his chief income) insist upon knowing the types of people (by industry or profession, by title) for whom the magazine is edited — and how many are getting it.

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The purpose of BPA is to assure advertisers . . . by frequently checking and rechecking . . . that each member publisher is indeed distributing his magazine, in the *numbers* promised, to the *types* of men he promised would receive it.

The BPA symbol in this magazine means that *you belong* . . . that because of your occupational interests you are qualified, in the eyes of the advertisers, to receive it.

The advertiser can thus tell whether he's getting his money's worth.

The publisher has a better sales story to prospective advertisers because his magazine is "audited."

And you, the reader, get more value from the magazine because both the advertisers and editors, knowing what your special occupation is and what your interests are, are better able to prepare advertising and editorial material that will be most informative and useful to you.

What you can do

Publishers and advertisers frequently write to magazine readers to learn what kind of articles and advertisements appeal most. Cooperate with them — will you? — by answering their questions . . . in the interest of better communications between makers and markets.

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Cutting time for the West

In the West you can plan your production time-tables with confidence when you specify Kaiser Steel, because you are assured of delivery *when promised.*

And because of the nearby location of Kaiser Steel's Fontana plant, you are assured of *the fastest possible carrier delivery time.*

As a result, you often can operate on smaller inventories, reducing capital investment—a powerful incentive for small business to get started and for large business to expand.

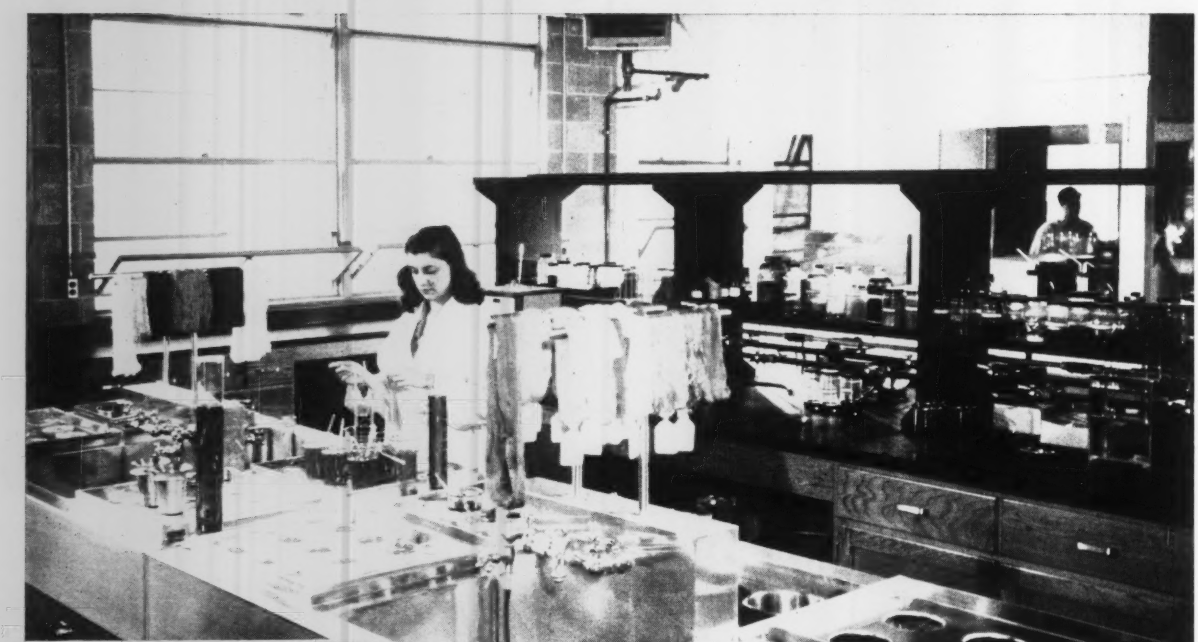
Currently, Kaiser Steel is busy completing a capacity-doubling expansion at Fontana that will establish us as the largest steelmaker west of the Mississippi.

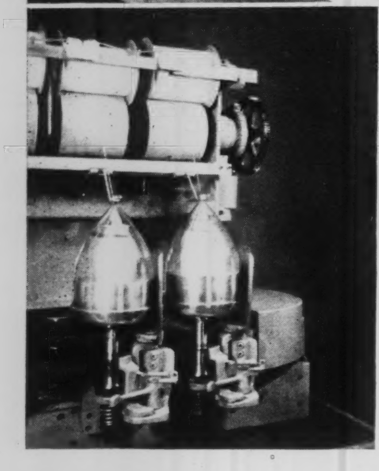
To the West, this means an additional capacity of 1,500,000 ingot tons annually of America's number-one metal. To our customers it means *service*—better than ever, *locally available* to meet their needs.

KAISER STEEL

BUILT TO SERVE THE GROWING WEST

Steel Mill Products: plates • hot rolled strip and sheet • cold rolled strip and sheet • tin plate • continuous weld pipe • electric weld pipe • alloy and carbon bars • bar shapes • structural shapes semi-finished steels • pig iron • ingot molds • coke by-products • **Fabricating Division:** steel fabrication for construction, aircraft, missile and other industries • expanded fusion weld pipe reinforced concrete pipe • tanks • For specifications, write: **KAISER STEEL CORPORATION** • **Los Angeles** • **Oakland** • **Seattle** • **Portland** • **Phoenix** • **Denver** • **Tulsa** • **New York**





Wherever you want to protect something

. . . that's a place for A-L Stainless Steel

In a textile plant, like the applications pictured above, Allegheny Ludlum Stainless Steel protects against off-colors in the dyeing and finishing department because it cleans up easily and quickly from batch to batch, leaving no traces of the previous dyes. In yarn twisters and other equipment in the weaving department, A-L Stainless provides the hard, smooth surface and high abrasion-resistance that protects against snagging and binding.

Food, beverage, dairy, drug and chemical plants use A-L Stainless Steel to protect the purity of their products; hospitals, hotels and restaurants use it to protect appearance and sanitary standards; cars, trains and planes use it to protect strength and safety. And they all gain a host of bonus benefits from stainless steel, too: such as far less cleaning and maintenance expense, far longer life in service, and far greater economy in the long run.

No other metal can match stainless steel in these qualities. In addition, A-L Stainless is easy to fabricate and we produce it in every form or shape that you may require.

- Let us help you to profit by it. *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.*

Write for your copy of "STAINLESS STEEL IN PRODUCT DESIGN"

40 pages of useful engineering and fabricating data, including practical examples showing where, when and how stainless steel improves design, adds benefits, helps sales.

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For Stainless Steel in ALL Forms—call

Allegheny Ludlum

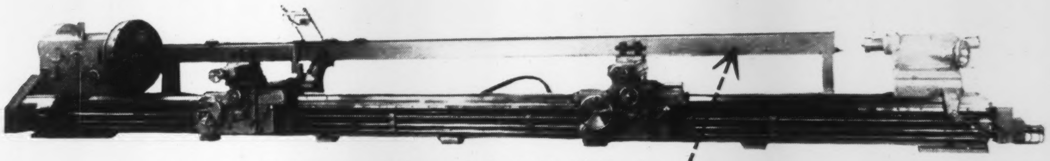
Warehouse stocks carried by all Ryerson Steel plants

A-L STAINLESS STEEL ®

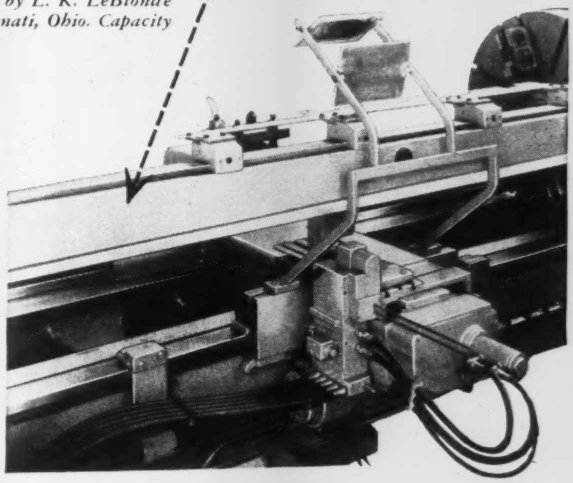
WSW 6092

Weldynamics

ARC WELDING AT WORK CUTTING COSTS



Duplicating lathe made by L. K. LeBlonde Machine Tool Co., Cincinnati, Ohio. Capacity 37′ between centers.



Planning for profit demands designing for lower cost

WELDYNAMICS lets you use steel and save. For example, because this lathe template rail is made of welded steel, it is 24% more rigid, weighs 54.6% less, and costs a third less than its cast counterpart. It was also simpler to design, and easier to fabricate and machine.

How you can use Weldynamics

Lincoln men, expert in Weldynamics, will help you. They offer the best in technical advice on design, procedures, equipment and electrodes.

Write for "Design Ideas", tips on designing for welded steel, sent at no cost to designers.

The World's Largest Manufacturer of Arc Welding Equipment

LINCOLN

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PREFERENTIAL ATTENTION
FOR YOUR RUSH ORDERS

RED CIRCLE SERVICE

RED CIRCLE SERVICE

The speed of Red Circle Service permits Acme-Newport customers to balance their inventories constantly without risking delays in obtaining additional tonnage. It was instituted to utilize the utmost coordination of modern facilities, good scheduling, personal attention to quality and service, and the flexibility of operation inherent in a mill of this size.

Every copy of your order is plainly marked with a red circle to speed processing and delivery. This service is our way of meeting present demands for spot requirements. Use Red Circle Service to maintain your inventories of flat rolled steel made to your exact specifications.

PRODUCTS OF
ACME-NEWPORT STEEL

HOT ROLLED STEEL IN COIL
HOT ROLLED PICKLED STEEL IN COIL
HOT ROLLED SHEETS
HOT ROLLED PICKLED SHEETS
COLD ROLLED STEEL IN COIL (*Full Hard only*)
COLD ROLLED SHEETS
ALLOY SHEETS AND PLATES
PLATES ($\frac{3}{16}$" *and lighter*)
ELECTRIC WELD LINE PIPE

Acme-Newport Steel
COMPANY
NEWPORT, KENTUCKY
A SUBSIDIARY OF ACME STEEL COMPANY

STEEL
January 6, 1958

Market Outlook

HERE'S what steel users can expect in 1958: Plentiful supplies, improved quality and service, and steady to slightly higher prices.

Here's why:

SUPPLY— Ready availability is the result of two factors: Steel production capacity is up; demand is down.

CAPACITY— The nation's ability to produce steel for ingots and castings has reached a record height of around 141 million net tons, representing an increase of 7.5 million tons in 12 months. (Official figures on capacity should be announced this month by the American Iron & Steel Institute.) Capacity will continue to grow (around 5 million tons this year) as expansion and rehabilitation projects are completed. The steel industry's latest expansion program, which started two years ago, stemmed from strong demand then and the expectation that the country will need more steel in the 1960s. Along with the increase in ingot capacity is a commensurate expansion in finishing equipment.

DEMAND— Two factors explain the decline: Steel users are not consuming as much tonnage as they were, and many are dipping into inventories. Reduced consumption stretches the life of inventories, but several analysts have predicted that reductions will be completed this year. Inventories of finished steel at the start of this year came to 19 million tons.

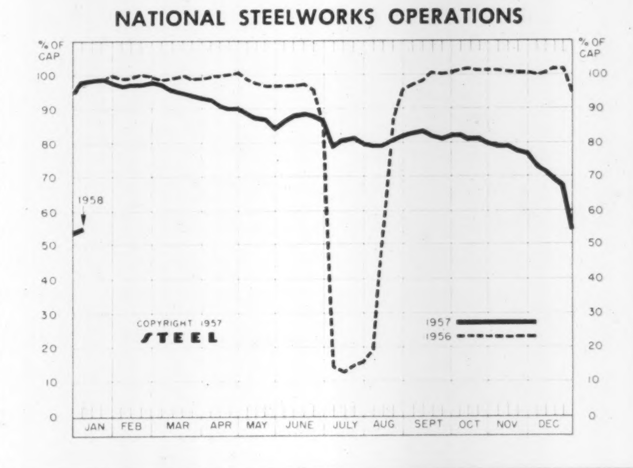
PRODUCTION— Reduced demand will hold output of steel for ingots and castings to around 110.5 million net tons this year, vs. 113 million net tons in 1957, economists in the steel industry think. Although tonnage will be down (especially in the early part of this year), the rate of production will look even lower because of the sharp increase in capacity. New capacity figures will automatically lower operating rates 3 to 4 points. So, the production pace will have to exceed the current rate of 73 million annual tons if we are to turn out 110.5 million in 1958.

PRICES— Increases are more likely than decreases. But the user will get more for his dollar. Competition among steel producers is spurring them to ship only the highest quality material and to provide superior service. Arguing against a price reduction are automatic wage increases to steelworkers this year and the belief among steel company executives that price cuts would not boost sales.

At yearend, Joseph L. Block, president, Inland Steel Co., Chicago, asserted that current steel prices are inadequate.

COSTS— The steel industry's labor costs went up 5 cents an hour on Jan. 1 because of a cost of living adjustment provided under the three-year labor contract. On July 1, steelworkers will get a general increase of 7 cents an hour, plus 0.2 cent in the differential between each of the job classifications, and increases in fringe benefits. The total will be around 13 cents an hour. By that time, there may be another upward adjustment for the cost of living.

Last July, when steelworkers received about the same amount of increase they will get next July 1, the price of steel went up an average of $6 a ton. Next July, the pricing decisions will be influenced strongly by the demand for steel and the economic state of the nation.



NATIONAL STEELWORKS OPERATIONS

DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Jan. 5	Change	Same 1957	Week 1956
Pittsburgh	55	+ 7.5	100	98
Chicago	70	— 3.5	100	99
Mid-Atlantic	80	— 0.5	102	96
Youngstown	50	+ 15	104	100
Wheeling	54.5	+ 5.5	99	98.5
Cleveland	59	+ 8*	93	96.5
Buffalo	56	— 5	107.5	105
Birmingham	72.5	0	94.5	93.5
New England	50	0	72	92
Cincinnati	60	0	94.5	88.5
St. Louis	51	0	84	99
Detroit	40	+ 3*	103	100
Western	77	0	103	103
National Rate ..	55	+ 1*	98	97

INGOT PRODUCTION‡

	Week Ended Jan. 5	Week Ago	Month Ago	Year Ago
INDEX .... (1947-49=100)	(n.a.)	85.5†	114.0	155.0
NET TONS .... (In thousands)	(n.a.)	1,374†	1,831	2,490

---

*Change from preceding week's revised rate. †Estimated. ‡American Iron & Steel Institute. (n.a.) Not available.

Weekly capacity (net tons): 2,559,490 in 1957; 2,461,893 in 1956.

(Advertisement)

Fastener Facts

by Henry Peterson, Chief Engineer — Judson L. Thomson Mfg. Co.

DESIGN
PRODUCTION
& PURCHASING
DATA

HOW TO MAKE BOTH ENDS NEAT

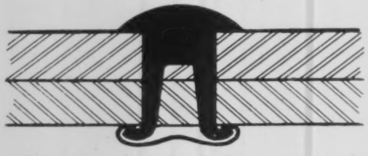
Is This Your Problem?

When both ends of a fastener can be seen and touched, it's often a problem to design an assembly that has neat lines and smooth surfaces.

Two Solutions:

The rivets pictured above show two popular means of making both ends neat. The most common way is to clinch the rivet inside a cap that looks like the head. The greater bearing surface provided by the caps prevents rivets from tearing loose and also strengthens materials. The other method is to use compression rivets, consisting of accurately matched pairs of solid and deep-drilled rivets that give a secure pressed fit.

1. Rivets Plus Caps



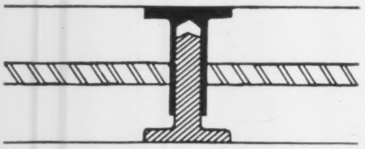
Thomson Standard Caps are made of steel and brass in diameters ranging from ¼" to 9/16" with flat or concave backs. They can be finished or japan-colored to match the self-piercing Thomson Deep-Drilled or Bifurcated (Split) Rivets of your choice.

Clinch strength with caps depends on your choice of rivet. The scored clinch of deep-drilled rivets is much stronger than the two-legged clinch of split rivets of the same diameter.

Thomson Caps are applied by a two-hopper machine that automatically feeds and sets all standard sizes of Thomson Deep-Drilled and Split Rivets and their matching caps. Hand-fed machines are also available.

Thomson Machines, in both bench and floor models, can be had to meet your special requirements.

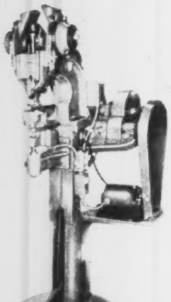
2. Compression Rivets



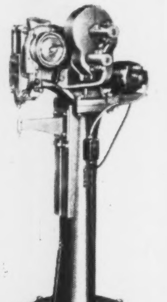
Thomson Compression Rivets come in precision-made male and female pairs. Each pair consists of a solid rivet with chamfered shank and a deep-drilled rivet to match. Because their most common use is for attaching handles to knives, they are often called "Cutlery Rivets".

Thomson Compression Rivets — cold headed from aluminum, brass, nickel silver and steel — are designed to seat snugly in counterbored holes. So, they give a smooth, projectionless surface to the product or assembly. They also provide the strongest pressed fit in the rivet industry. Heads may be trimmed in a secondary operation when more critical tolerances are required.

You have a choice of Thomson Rivet-Setting Machines for applying Compression Rivets: Thomson Knife Handle Machine (Style 137A) or two standard Thomson Rivet-Setting Machines (Style 161) in tandem.



Style 137A



Style 161

The Thomson Knife Handle Machine is a versatile special-purpose machine that inserts male and female rivets into assemblies in a single operation. It handles rivets with heads up to 3/16" diameter . . . and lengths up to 1". Its arm is adjustable for the various assembly thicknesses and rivets lengths within its capacity.

When two standard Thomson Rivet-Setting Machines are used, one inserts the deep-drilled rivet; the other sets the solid rivet into the mate's hollow shank.

Complete Line:

Whatever your fastening problem, there's a Thomson Rivet that will cut costs and speed assembly. More than 800 stocked standards and more than 8000 standards in print-form promise you the kind of service that saves time and money.

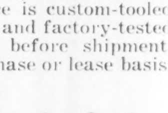
More than 250 styles of Thomson Rivet-Setting Machines also offer you the advantages of high production rates on your assembly lines. The machine of your choice is custom-tooled for your application and factory-tested on actual samples before shipment. Available on a purchase or lease basis.

Design and Engineering Service

Thomson analyzes your fastening problems and makes specific rivet and machine recommendations . . . at little or no cost. When called in before designs are frozen, our engineers can help you design around standard rivets and machines that cut costs and speed assembly. Thomson also saves time and money on your current fastening jobs by giving you a choice of more than 800 standard rivet types and sizes. Submit sketches, prints or samples for recommendations and quotations.

Free "Fastener Fact File"

This authoritative manual on all phases of riveting is "must" reading for anybody responsible for specifying or buying low-cost fasteners. It covers rivet types, applications, materials, finishes and other factors that simplify selection of the right rivet machine for any job. For your free copy, write: Judson L. Thomson Mfg. Co., Dept. S, Waltham 54, Mass.



JUDSON L. THOMSON MFG. CO., WALTHAM 54, MASS.

COMPONENTS	PRESENT LEVEL COMPARED WITH 3 MONTHS AGO		First Quarter Forecast
CASTINGS[1]	9%	HIGHER	15%
	42%	SAME	60%
	49%	LOWER	25%
OTHER FORMED COMPONENTS[2]	8%	HIGHER	15%
	46%	SAME	55%
	46%	LOWER	30%
MACHINED COMPONENTS[3]	9%	HIGHER	13%
	49%	SAME	62%
	42%	LOWER	25%
FASTENERS	8%	HIGHER	11%
	40%	SAME	61%
	52%	LOWER	28%
ELECTRICAL EQUIPMENT AND MOTORS	10%	HIGHER	9%
	43%	SAME	64%
	47%	LOWER	27%
MECHANICAL RUBBER GOODS AND BELTING	5%	HIGHER	10%
	60%	SAME	69%
	35%	LOWER	21%

[1] Die, gray iron, malleable, nonferrous, steel.
[2] Forgings, stampings, springs, wire shapes.
[3] Bearings, couplings, cylinders, gears, screw machine products.

Left column shows percentages of PAs in STEEL's survey whose current inventories are higher, the same, or lower than those of three months ago. Right column figures and bar graphs show how the buyers think their stocks will change three months hence

Component Buyers Cut Inventories

WARY about first quarter business conditions, purchasing agents are buying no more industrial components than orders in hand seem to justify.

STEEL's latest survey of component inventories shows that buyers are less confident today than they were a year ago. Only 13 per cent of this year's survey respondents say they'll add to their stockpiles during the first quarter. A year ago, 20 per cent said they would.

Cutbacks Continue—First quarter demand for machined components (bearings, couplings, cylinders, gears, and screw machine products) will be markedly lower this year, say the buyers. Only 13 per cent will add to their stocks, while 25 per cent will cut back. In January, 1957, 24 per cent expected higher inventories, 12 per cent lower.

Electrical equipment and motors will be in less demand during the early months of 1958 than in the corresponding period last year. Nine per cent of the respondents will increase their inventories; 27 per cent will reduce them. A year ago, 25 per cent expected to build; only 15 per cent forecast reductions.

It's the same story for castings, fasteners, and mechanical rubber goods: Fewer buyers will add to first quarter inventories this year; more will cut back. The trend in "other formed components" (forgings, stampings, springs, and wire shapes) is harder to define. Fifteen per cent of this year's survey participants say they will increase their stocks; 30 per cent will reduce them. A year ago, fewer buyers (9 per cent) expected to build inventories, but fewer (20 per cent) expected to curtail them.

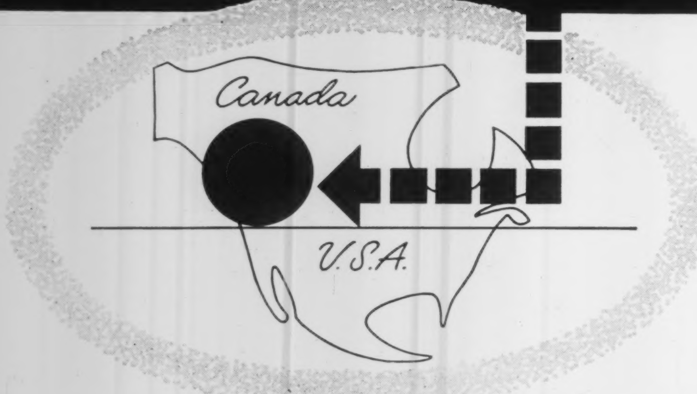
In Retrospect—The fourth quarter inventory cutback was more pronounced than the buyers thought it would be. In the previous survey (STEEL, Oct. 7, 1957, p. 231), 29 per cent of the respondents predicted that their yearend stocks would be lower. Today, 46 per cent say their inventories are lower than they were three months ago.

While one respondent (a producer of tractors and agricultural implements) was building inventories to meet a seasonal increase in production, another (a manufacturer of heat treating furnaces) was cutting back in anticipation of yearend stock-taking.

Few Problems—The buyers are unanimous in reporting that deliveries are generally satisfactory. Says one respondent: "It's more difficult to hold delivery back than to expedite it on most items." A few (4 per cent) say they have trouble obtaining castings for special requirements; 3 per cent have difficulty with gears, 3 per cent with Monel products.

Most of the purchasing agents favor 30 to 60 day inventories of the major industrial components.

WHERE INDUSTRY FLOURISHES



Hydro Electric Power, Natural Gas, Oil, Dependable Manpower, Planned Industrial Estates, Transportation, Markets.

BRITISH COLUMBIA

CANADA'S PACIFIC COAST INDUSTRIAL AREA

FOR INFORMATION WRITE: DEPARTMENT OF INDUSTRIAL DEVELOPMENT, TRADE AND COMMERCE, PARLIAMENT BUILDINGS, VICTORIA, B.C., CANADA

Twelve per cent say their inventories of castings are too high; 6 per cent have too many bearings on hand; 5 per cent have too many forgings.

Tin Plate . . .

Tin Plate Prices, Page 493

Tin plate is one steel product that is expected to enjoy substantial demand this year. Bookings for first quarter shipment are reported to be comfortable in the Chicago district.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 484 & 485

The first sign of weakening mill prices has developed on the Pacific Coast. Kaiser Steel Corp. recently put into effect reductions of $3 a ton on hot-rolled carbon sheets and strip, now quoting $5.675 per 100 lb, f.o.b. Fontana, Calif.

Similar reductions were made on Kaisaloy and Kaiwell sheets.

The market situation on the West Coast is noticeably soft; district warehouses recently slashed prices across the board.

A major Pittsburgh area supplier of sheets thinks talk of stronger demand will be "premature" until 1958 model automobile sales improve substantially. Expectations are the autobuilders will hold down buying to the recent reduced volume through first quarter. A large auto body plant in the Pittsburgh district has increased its earlier estimates of January needs. But the increase brings the month's requirements only up to the low December mark.

Despite holiday shutdowns, Detroit suppliers say orders have not been cut since a week or so ago. Some are expecting further cutbacks, particularly for stainless strip and hot-rolled sheets.

Demand from other consuming lines is not sufficiently strong to take up the slack occasioned by the sluggishness in automobiles.

Eastern suppliers are booking first quarter sheet and strip orders slowly, but some improvement over December volume is noted. Bookings for the quarter are not likely to shape up much better than the fourth quarter, 1957, total.

In many cases, buying is curtailed by inventories of steel and stocks of finished goods. Cutbacks and layoffs in business machine production, typewriters, adding machines and small computers, are widespread, notably in Connecticut. This restricts strip volume and is due to the building up of large inventories following the slump in sales over the last three or four months.

Steel Bars . . .

Bar Prices, Page 491

Lower consumption and comfortable inventories tend to keep forward buying of steel bars at a minimum level.

Except for warehouses, buyers' inventories of cold-drawn bars are ebbing in the East. Most purchasers have bought only hand to mouth for months. But a mild improvement in February delivery orders is reported. January shipments are available, but many users do not want shipment until the middle of the first quarter.

Inventories of hot-rolled bars are relatively larger than cold-drawn stocks—notably converters' supplies.

Bar shipments last year were better than some sellers had anticipated. The total for the year is placed at 10.7 million tons, nearly 14 per cent of total finished steel tonnage. Production of bar shapes was high, and demand for reinforcing bars was close to what it was in 1956.

A major Pittsburgh supplier of hot-rolled products who had been hoping for a January upswing in bar sales now sees little likelihood of any change from the low December sales level.

Wire . . .

Wire Prices, Pages 493 & 494

Some wire mills resumed finishing operations at 50 to 60 per cent of capacity, following longer than usual yearend shutdowns.

Bookings for January-February shipment are heavier than they were in the fourth quarter of 1957. This points to an increase in operations of 10 to 15 per cent. Primary steel operations are not likely to pick up much because rod inventories are sufficient to meet the mild increase in demand for wire products in general.

Some consumers who held down inventories for tax purposes last quarter are placing moderate orders for estimated or known requirements over the next two months. Few buyers are anticipating tonnage beyond that, with deliveries prompt on all carbon grades.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 491

Suppliers of reinforcing steel bars anticipate an improvement in sales during March and April. Several Pittsburgh area sellers have already booked tonnage for spring delivery in "more than normal" amounts. Hope for an upturn in activity in the district is based on plans for construction of parking garages and housing projects. Some sales managers think the federal highway program is not likely to require large bar tonnages this summer.

West coast producers report they had open tonnage during December. They have reduced leadtime for orders to less than three weeks in most cases.

Production is being tailored to slower demand in the Pacific

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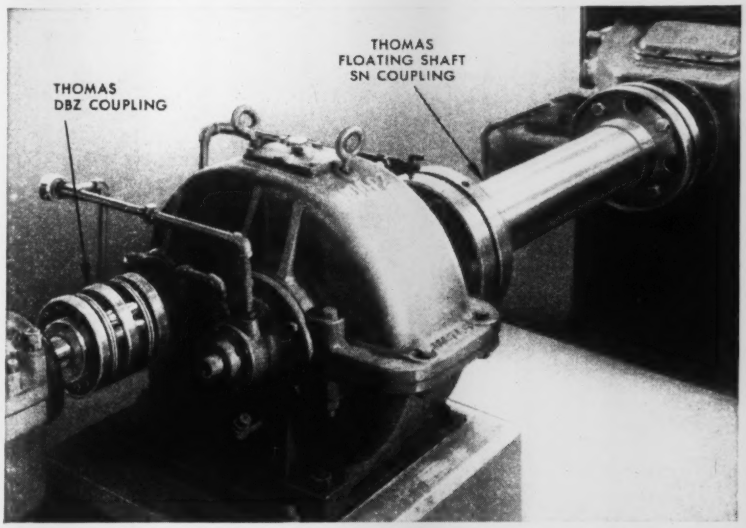

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Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Couplings should last a lifetime.

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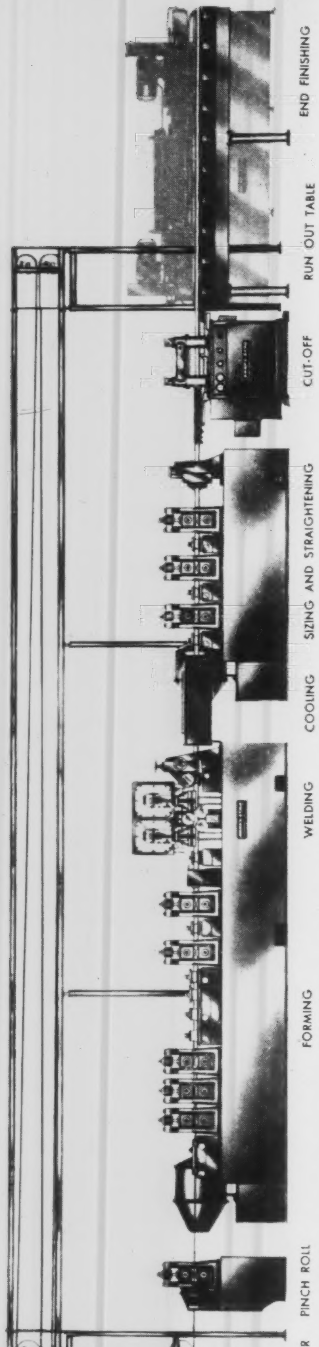

ETNA TUBE MILLS
PACKAGE INSTALLATIONS

Highest-known production speeds combined with greater forming accuracy and better finishes are just a few of the outstanding benefits of an Abbey Etna tube or pipe mill. With Abbey Etna universal drive mills, a wide variety of interchangeable metals can be formed in sizes ranging from ¼-inch OD—.022 wall to 16-inch OD—.500 wall.

Abbey Etna specializes in package installations. From a customer's basic production requirements, Abbey Etna will design, engineer and install an integrated production facility to produce competitively marketable tubular products. From a single machine or mill installation to an automated plant, Abbey Etna offers one-source package installations.

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TUBE CUTOFF MACHINES • TUBE END FACING MACHINES • TUBE HANDLING EQUIPMENT • ALLIED EQUIPMENT • SWAGERS

Northwest. Mill backlogs in the area are shrinking. Northwest Steel Rolling Mills Inc. was down two weeks for the holiday vacation and plant overhaul. Generally, management anticipates early action on a considerable volume of pending work.

Semifinished Steel . . .

Semifinished Prices, Page 491

Ingot producing capacity at the start of the year is expected to be pegged at 141 million net tons annually, about 7.5 million tons above the 1957 figure.

Assuming tonnage output holds close to recent levels, the increased capacity will result in a percentage-of-operation rate cut of possibly four to five points.

Republic Steel Corp., relighted five open hearths Dec. 29 at its Youngstown Works. All furnaces had been idle since Dec. 7. The company also started up its bessemers, operating them eight turns. It also projected resumption of one, possibly two, blast furnaces.

Tubular Goods . . .

Tubular Goods Prices, Page 496

Laclede Steel Co. has completed its first trial run of tubing on its new continuous mill at its Alton, Ill., works. The mill, first of its kind in the Mississippi Valley, will more than double the company's pipemaking capacity this year. Full operation is expected in spring.

Pipe (½ through 4 in., in lengths up to 60 ft) will be produced in a 600-ft long building, which brings the over-all length of Laclede's tube mill to 725 ft. The heating furnace occupies 155 ft. Conduit also will be produced.

Demand for cast iron pipe is dormant seasonally, but an early revival is anticipated as municipalities prepare for spring installations. Pending business includes 200 tons for Anderwood Manor, a suburb of Seattle.

Unfilled orders for pressure tube, oil country tubing, and line pipe continue to drop. Bookings for line pipe, though, exend into 1960. In oil country goods, demand is firm for high alloy products. These are not large tonnage items, and some mills had idle capacity at December's end.

Pressure tubing demand is

slightly stronger than that for mechanical tubing. Demand from warehouses and autobuilders is extremely slow. There were some order cancellations for pressure tubing last month. A large Pittsburgh area supplier had difficulty adjusting production schedules to meet a large number of small orders for a wide variety of specialty tubing.

Warehouse . . .

Warehouse Prices, Page 498

Warehouse operations were reduced sharply late in December by the seasonal slowdown in construction and yearend curtailment of production in fabricating generally.

Officials of one midwest steel mill estimate that automobile manufacturers are reducing inventories at a rate of about 1 million tons a month. Reductions are expected to continue through the first half of the new year. Producers of automobile components who generally are active buyers in the warehouse market will probably order sparingly for some time into the first quarter.

A distributor in the Detroit area says his business for nonproductive and maintenance items is as good as it was a month ago. He admits, though, that demand for production items is much slower than it was during the early months of 1957.

Rumors of price cutting by distributors are on the increase. Two products in particular are involved: Sheets and light plates. Salesmen are beating the bushes for business. A year ago, higher-priced foreign steel was coming into many districts, and some conversion steel was being used. Delivery dates were greatly extended, particularly on structural steel, and many customers were paying premium prices. Domestic supplies of all products are now reported to be adequate.

An executive of Peter A. Frasse & Co., Buffalo, describes the situation this way: "We're going through a leveling-off period, like 1949 and 1954. The way I see it, the traditional seasonal pickup will come in January, and then our business will taper off again. After the first six months of 1958, I look for an improvement."

READ THIS

METALWORKING COMPANIES
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FACT The City of Philadelphia alone has more metalworking plants—506—than each of 35 states.

FACT The City of Philadelphia has more metalworking employees—133,663—than each of 34 states. These employees represent more than 40 percent of the total non-government manufacturing employment in Philadelphia.

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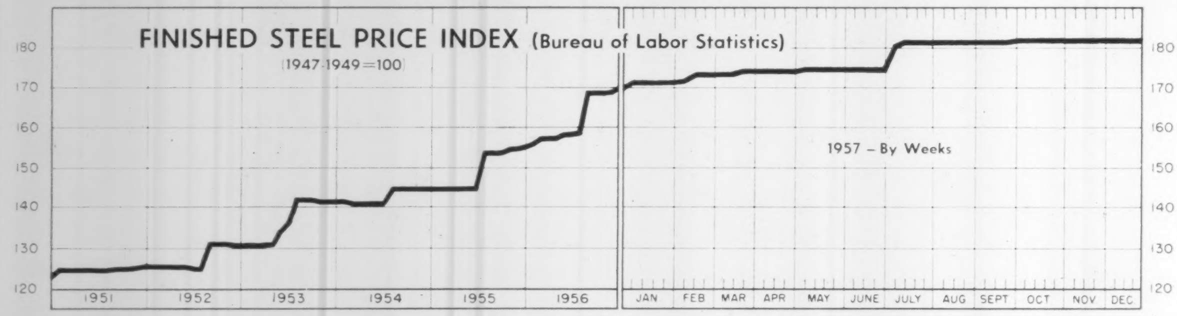
Att: Fredric R. Mann, *Director of Commerce* (Confidential)

Price Indexes and Composites



Dec. 31, 1957	Week Ago	Month Ago	Dec. Avg.	Year Ago
181.7†	**181.7**	**181.7**	**181.7**	**169.9**

†Preliminary

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Dec. 31

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.600
Rails, Light, 40 lb	7.067
Tie Plates	6.600
Axles, Railway	9.825
Wheels, Freight Car, 33 in. (per wheel)	60.000
Plates, Carbon	6.150
Structural Shapes	5.942
Bars, Tool Steel, Carbon (lb)	0.535
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.650
Bars, Tool Steel, H.R., Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.355
Bars, Tool Steel, H.R., Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.850
Bars, H.R., Alloy	10.525
Bars, H.R., Stainless, 303 (lb)	0.525
Bars, H.R., Carbon	6.425
Bars, Reinforcing	6.210
Bars, C.F., Carbon	10.360
Bars, C.F., Alloy	13.875
Bars, C.F., Stainless, 302 (lb)	0.553
Sheets, H.R., Carbon	6.192
Sheets, C.R., Carbon	7.089
Sheets, Galvanized	8.220
Sheets, C.R., Stainless, 302 (lb)	0.688
Sheets, Electrical	12.025
Strip, C.R., Carbon	9.243
Strip, C.R., Stainless, 430 (lb)	0.493
Strip, H.R., Carbon	6.245
Pipe, Black, Buttweld (100 ft)	19.814
Pipe, Galv., Buttweld (100 ft)	23.264
Pipe, Line (100 ft)	199.023
Casing, Oil Well, Carbon (100 ft)	194.499
Casing, Oil Well, Alloy (100 ft)	304.610
Tubes, Boiler (100 ft)	49.130
Tubing, Mechanical, Carbon (100 ft)	24.953
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	9.783
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.483
Black Plate, Canmaking Quality (95 lb base box)	7.583
Wire, Drawn, Carbon	10.225
Wire, Drawn, Stainless, 430 (lb)	0.653
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.828
Wire, Barbed (80-rod spool)	8.719
Woven Wire Fence (20-rod roll)	21.737

STEEL's FINISHED STEEL PRICE INDEX*

	Dec. 31 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	239.15	239.15	239.15	225.92	181.31
Index in cents per lb	6.479	6.479	6.479	6.111	4.912

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$145.42	$145.42	$146.03	$137.98	$110.98
No. 2 Fdry Pig Iron, GT	66.49	66.49	66.49	62.63	55.04
Basic Pig Iron, GT	65.99	65.99	65.99	62.18	54.66
Malleable Pig Iron, GT	67.27	67.27	67.27	63.41	55.77
Steelmaking Scrap, GT	33.17	33.17	32.33	63.17	43.00

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*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Dec. 31 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.425	5.425	5.425	5.075	3.95
Bars, H.R., Chicago	5.425	5.425	5.425	5.075	3.95
Bars, H.R., deld., Philadelphia	5.725	5.725	5.725	5.365	4.502
Bars, C.F., Pittsburgh	7.30*	7.30*	7.30*	6.85*	4.925
Shapes, Std., Pittsburgh	5.275	5.275	5.275	5.00	3.85
Shapes, Std., Chicago	5.275	5.275	5.275	5.00	3.85
Shapes, deld., Philadelphia	5.545	5.545	5.545	5.31	4.13
Plates, Pittsburgh	5.10	5.10	5.10	4.85	3.90
Plates, Chicago	5.10	5.10	5.10	4.85	3.90
Plates, Coatesville, Pa.	5.10	5.10	5.10	5.25	4.35
Plates, Sparows Point, Md.	5.10	5.10	5.10	4.85	3.90
Plates, Claymont, Del.	5.70	5.70	5.70	5.70	4.35
Sheets, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.775
Sheets, H.R., Chicago	4.925	4.925	4.925	4.675	3.775
Sheets, C.R., Pittsbugh	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Chicago	6.05	6.05	6.05	5.75	4.575
Sheets, C.R., Detroit	6.05-6.15	6.05-6.15	6.05-6.15	5.75-5.85	4.775
Sheets, Galv., Pittsburgh	6.60	6.60	6.60	6.30	5.075
Strip, H.R., Pittsburgh	4.925	4.925	4.925	4.675	3.75-4.225
Strip, H.R., Chicago	4.925	4.925	4.925	4.675	3.725
Strip, C.R., Pittsburgh	7.15	7.15	7.15	6.85	5.10-5.80
Strip, C.R., Chicago	7.15	7.15	7.15	6.85	5.35
Strip, C.R., Detroit	7.25	7.25	7.25	6.95	5.30-6.05
Wire, Basic, Pittsburgh	7.65	7.65	7.65	7.20	5.10-5.225
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.20	6.20-6.35
Tin plate (1.50 lb) box, Pitts.	$10.30	$10.30	$10.30	$9.95	$8.95

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*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$96.00	$96.00	$96.00	$91.50	$70.50
Wire rods, $\frac{7}{32}$-$\frac{5}{8}$" Pitts.	6.15	6.15	6.15	5.80	4.425

PIG IRON, Gross Ton	Dec. 31 1957	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pitts.	$67.00	$67.00	$67.00	$63.50	$55.50
Basic, Valley	66.00	66.00	66.00	62.50	54.50
Basic, deld., Phila.	70.01	70.01	70.01	66.38	59.25
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	63.00	55.00
No. 2 Fdry, deld., Phila.	70.51	70.51	70.51	66.88	59.75
No. 2 Fdry, Birm.	62.50	62.50	62.50	59.00	51.38
No. 2 Fdry (Birm.) deld. Cin.	70.20	70.20	70.20	66.70	58.93
Malleable, Valley	66.50	66.50	66.50	63.00	55.00
Malleable, Chicago	66.50	66.50	66.50	63.00	55.00
Ferromanganese, Duquesne	245.00†	245.00†	245.00†	235.00†	228.00*

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†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$31.50	$31.50	$31.50	$62.50	$44.00
No. 1 Heavy Melt, E. Pa.	37.00	37.00	33.50	63.00	41.50
No. 1 Heavy Melt, Chicago	31.00	31.00	32.00	64.00	42.50
No. 1 Heavy Melt, Valley	29.50	29.50	29.50	66.50	44.00
No. 1 Heavy Melt, Cleve.	26.50	26.50	26.50	63.50	43.00
No. 1 Heavy Melt, Buffalo	30.50	30.50	32.50	62.50	43.00
Rails, Rerolling Chicago	49.50	49.50	48.00	89.50	52.50
No. 1 Cast, Chicago	39.50	38.50	35.50	50.50	44.00

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.25	$15.25	$15.25	$15.00	$14.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.00	17.00

Steel Prices

Mill prices as reported to STEEL, Dec. 31, cents per pound **except** as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 592; to footnotes, page 494.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 .....$73.50

INGOTS, Alloy (NT)

Detroit S41 ....$77.00
Farrell,Pa. S3 ....77.00
Lowellville,O. S3 ......77.00
Midland,Pa. C18 ......77.00
Munhall,Pa. U5 ......77.00
Sharon,Pa. S3 ....77.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)

Bessemer,Pa. U5 ....$77.50
Buffalo R2 ....77.50
Clairton,Pa. U5 ......77.50
Ensley,Ala. T2 ....77.50
Fairfield,Ala. T2 .....77.50
Fontana,Calif. K1 ....88.00
Gary,Ind. U5 ....77.50
Johnstown,Pa. B3 ....77.50
Lackawanna,N.Y. B2 ..77.50
Munhall,Pa. U5 ......77.50
S.Chicago,Ill. R2, U5..77.50
S.Duquesne,Pa. U5 ....77.50
Sterling,Ill. N15 ......77.50
Youngstown R2 ....77.50

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$96.00
Buffalo R2 ....96.00
Canton,O. R2 ....98.50
Clairton,Pa. U5 ......96.00
Conshohocken,Pa. A3.101.00
Ensley,Ala. T2 ....96.00
Fairfield,Ala. T2 .....96.00
Fontana,Calif. K1 ....105.50
Gary,Ind. U5 ....96.00
Geneva,Utah C11 .....96.00
Houston S5 ....101.00
Johnstown,Pa. B2 .....96.00
Lackawanna,N.Y. B2...96.00
LosAngeles B3 ....105.50
Midland,Pa. C18 .....96.00
Munhall,Pa. U5 ....96.00
Seattle B3 ....109.50
Sharon,Pa. S3 ....96.00
S.Chicago R2, U5, W14.96.00
S.Duquesne,Pa. U5 ...96.00
S.SanFrancisco B3 ...105.50
Warren,O. C17 ....96.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 ..$114.00
Bridgeport,Conn. C32..114.00
Buffalo R2 ....114.00
Canton,O. R2, T7 ....114.00
Conshohocken,Pa. A3..121.00
Detroit S41 ....114.00
Economy,Pa. B14 ....114.00
Farrell,Pa. S3 ....114.00
Fontana,Calif. K1 ....135.00
Gary,Ind. U5 ....114.00
Houston S5 ....119.00
Ind.Harbor,Ind. Y1 ..114.00
Johnstown,Pa. B2 ...114.00
Lackawanna,N.Y. B2 .114.00
Los Angeles B3 .....134.00
Lowellville,O. S3 .....114.00
Massillon,O. R2 .....114.00
Midland,Pa. C18 .....114.00
Munhall,Pa. U5 ......114.00
Sharon,Pa. S3 ....114.00
S.Chicago R2,U5,W14.114.00
S.Duquesne,Pa. U5 ...114.00
Struthers,O.Y1 ....114.00
Warren,O. C17 ....114.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ....$117.50
Buffalo R2 ....117.50
Canton,O. R2 ....120.00
Cleveland R2 ....117.50
Gary,Ind. U5 ....117.50
S.Chicago.Ill. R2, W14 117.50
S.Duquesne,Pa. U5 ...117.50
Warren,O. C17 ....117.50

SKELP

Aliquippa,Pa. J5 .....5.075
Munhall,Pa. U5 ......4.875
Warren,O. R2 ....4.875
Youngstown R2, U5 ..4.875

WIRE RODS

AlabamaCity,Ala. R2 ..6.15
Aliquippa,Pa. J5 ....6.15
Alton,Ill. L1 ....6.35
Buffalo W12 ....6.15
Cleveland A7 ....6.15
Donora,Pa. A7 ....6.15
Fairfield,Ala. T2 ......6.15
Houston S5 ....6.40
IndianaHarbor,Ind. Y1..6.15
Johnstown,Pa. B2 .....6.15
Joliet,Ill. A7 ....6.15
KansasCity,Mo. S5 ....6.40
Kokomo,Ind. C16 .....6.25
LosAngeles B3 ....6.95
Minnequa,Colo. C10 ....6.40
Monessen,Pa. P7 ......6.15
N.Tonawanda,N.Y. B11.6.15
Pittsburg,Calif. C11 ....6.95
Portsmouth,O. P12 ....6.15
Roebling,N.J. R5 .....6.25
S.Chicago,Ill. R2 ......6.15
SparrowsPoint,Md. B2 ..6.25
Sterling,Ill. (1) N15 ....6.15
Sterling,Ill. N15 ....6.25
Struthers,O. Y1 ....6.15
Worcester,Mass. A7 ....6.45

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 .....5.275
Atlanta A11 ....5.475
Aliquippa,Pa. J5 ......5.275
Bessemer,Ala. T2 .....5.275
Bethlehem,Pa. B2 .....5.325
Birmingham C15 .....5.275
Clairton,Pa. U5 ......5.275
Fairfield,Ala. T2 .....5.275
Fontana,Calif. K1 ....6.075
Gary,Ind. U5 ....5.275
Geneva,Utah C11 .....5.275
Houston S5 ....5.375
Ind.Harbor,Ind. I-2 ...5.275
Johnstown,Pa. B2 ....5.325
Joliet,Ill. P22 ....5.275
KansasCity,Mo. S5 ....5.375
Lackawanna,N.Y. B2..5.325
LosAngeles B3 ....5.975
Minnequa,Colo. C10 ..5.575
Munhall,Pa. U5 ....5.275
Niles,Calif. P1 ....5.925
Phoenixville,Pa. P4 ...5.325
Portland,Oreg. O4 ....6.025
Seattle B3 ....6.025
S.Chicago,Ill. U5, W14.5.275
S.SanFrancisco B3 ....5.925
Sterling,Ill. N15 ....5.275
Torrance,Calif. C11 ....5.975
Weirton,W.Va. W6 ....5.275

Wide Flange

Bethlehem,Pa. B2 ....5.325
Clairton,Pa. U5 ....5.275
Fontana,Calif. K1 ....6.225
IndianaHarbor,Ind. I-2.5.275
Lackawanna,N.Y. B2 ..5.325
Munhall,Pa. U5 ....5.275
Phoenixville,Pa. P4 ....5.325
S.Chicago,Ill. U5 .....5.275

Alloy Std. Shapes

Aliquippa,Pa. J5 ......6.55
Clairton,Pa. U5 ....6.55
Gary,Ind. U5 ....6.55
Houston S5 ....6.65
KansasCity,Mo. S5 .....6.65
Munhall,Pa. U5 ....6.55
S.Chicago,Ill. U5 ......6.55

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ......7.75
Bessemer,Ala. T2 ......7.75
Bethlehem,Pa. B2 ......7.80
Clairton,Pa. U5 ....7.75
Fairfield,Ala. T2 ......7.75
Fontana,Calif. K1 .....8.55
Gary,Ind. U5 ....7.75
Geneva,Utah C11 ......7.75
Houston S5 ....7.85
Ind.Harbor.Ind. I-2, Y1 7.75
Johnstown,Pa. B2 .....7.80
KansasCity,Mo. S5 .....7.85
Lackawanna,N.Y. B2 ..7.80
LosAngeles B3 ....8.45
Munhall,Pa. U5 ....7.75
Seattle B3 ....8.50
S.Chicago,Ill. U5, W14..7.75
S.SanFrancisco B3 .....8.40
Struthers,O. Y1 ....7.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 .....7.80
Lackawanna,N.Y. B2 ..7.80
Munhall,Pa. U5 ....7.75
S.Chicago,Ill. U5 ....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ....5.325
Lackawanna,N.Y. B2..5.325
Munhall,Pa. U5 ......5.275
S.Chicago,Ill. U5 ......5.275

STEEL SHEET PILING

Lackawanna,N.Y. B2 ..6.225
Munhall,Pa. U5 ....6.225
S.Chicago,Ill. U5 .....6.225
Weirton,W.Va. W6 ....6.225

PLATES

PLATES, Carbon Steel

Ala.City, Ala. R2 .....5.10
Aliquippa,Pa. J5 ....5.10
Ashland,Ky. (15) A10..5.10
Bessemer,Ala. T2 .....5.10
Clairton,Pa. U5 ....5.10
Claymont,Del. C22 .....5.10
Cleveland J5, R2 ....5.20
Coatesville,Pa. L7 .....5.10
Conshohocken,Pa. A3 ..5.20
Ecorse,Mich. G5 ......5.20
Fairfield,Ala. T2 ....5.10
Fontana,Calif.(30) K1 ..5.90
Gary,Ind. U5 ....5.10
Geneva,Utah C11 ......5.10
GraniteCity,Ill. G4 ....5.30
Harrisburg,Pa. P4 ......5.10
Houston S5 ....5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa. B2 .....5.10
Lackawanna,N.Y. B2 ..5.10
LoneStar,Tex. L6 ......5.45
Mansfield,O. E6 ....5.10
Minnequa,Colo. C10 ....5.95
Munhall,Pa. U5 ....5.10
Newport,Ky. A2 ....5.10
Pittsburgh J5 ....5.10
Riverdale,Ill. A1 ....5.10
Seattle B3 ....6.00
Sharon,Pa. S3 ....5.10
S.Chicago,Ill. U5, W14 5.10
SparrowsPoint,Md. B2 ..5.10
Sterling,Ill. N15 ....5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 ....5.10
Youngstown U5, Y1 ...5.10

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 .....6.75
Fontana,Calif. K1 .....7.55
Geneva,Utah C11 ......6.75
Houston S5 ....6.85
Johnstown,Pa. B2 .....6.75
SparrowsPoint,Md. B2 ..6.75

PLATES, Wrought Iron

Economy,Pa. B14 .....13.15

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.625
Bessemer,Ala. T2 .....7.625
Clairton,Pa. U5 ....7.625
Claymont,Del. C22 .....7.625
Cleveland J5, R2 ....7.625
Coatesville,Pa. L7 ....7.925
Conshohocken,Pa. A3 ..7.625
Economy,Pa. B14 ....7.625
Ecorse,Mich. G5 ....7.725
Fairfield,Ala. T2 ....7.625
Farrell,Pa. S3 ....7.625
Fontana,Calif.(30) K1 .8.425
Gary,Ind. U5 ....7.625
Geneva,Utah C11 .....7.625
Houston S5 ....7.725
Ind.Harbor,Ind. I-2, Y1 7.625
Johnstown,Pa. B2 ....7.625
Munhall,Pa. U5 ......7.625
Pittsburgh J5 ....7.625
Seattle B3 ....8.525
Sharon,Pa. S3 ....7.625
S.Chicago,Ill. U5, W14 7.625
SparrowsPoint,Md. B2..7.625
Warren,O. R2 ....7.625
Youngstown U5 ....7.625

PLATES, ALLOY

Aliquippa,Pa. J5 ......7.20
Claymont,Del. C22 ......7.20
Coatesville,Pa. L7 .....7.20
Economy,Pa. B14 .....7.20
Farrell,Pa. S3 ....7.20
Fontana,Calif.(30) K1 ..8.00
Gary,Ind. U5 ....7.20
Houston S5 ....7.30
Ind.Harbor,Ind. Y1 ....7.20
Johnstown,Pa. B2 .....7.20
Lowellville,O. S3 ......7.20
Munhall,Pa. U5 ....7.20
Newport,Ky. A2 ....7.20
Pittsburgh J5 ....7.20
Seattle B3 ....8.10
Sharon,Pa. S3 ....7.20
S.Chicago,Ill. U5, W14..7.20
SparrowsPoint,Md. B2 ..7.20
Youngstown Y1 ....7.20

FLOOR PLATES

Cleveland J5 ....6.175
Conshohocken,Pa. A3 ..6.175
Ind.Harbor,Ind. I-2 ...6.175
Munhall,Pa. U5 ....6.175
S.Chicago,Ill. U5 .....6.175

PLATES, Ingot Iron

Ashland c.l. (15) A10..5.35
Ashland l.c.l. (15) A10..5.85
Cleveland c.l. R2 ......5.85
Warren,O. c.l. R2 .....5.85

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)

Ala.City,Ala.(9) R2 ..5.425
Aliquippa,Pa. (9) J5 ...5.425
Alton,Ill. L1 ....5.625
Atlanta(9) A11 ....5.625
Bessemer,Ala.(9) T2 ..5.425
Birmingham(9) C15 ..5.425
Buffalo(9) R2 ....5.425
Clairton,Pa. (9) U5 ....5.425
Cleveland(9) R2 .....5.425
Ecorse,Mich.(9) G5 ....5.525
Emeryville,Calif. J7 ..6.175
Fairfield,Ala(9) T2 ..5.425
Fairless,Pa. (9) U5 ..5.575
Fontana,Calif.(9) K1 ..6.125
Gary,Ind.(9) U5 ......5.425
Houston (9) S5 ......5.675
Ind.Harbor(9) I-2, Y1 5.425
Johnstown,Pa.(9) B2 ..5.425
Joliet,Ill. P22 ....5.425
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ...5.425
LosAngeles(9) B3 ....6.125
Milton,Pa. M18 ....5.575
Minnequa,Colo. C10 ..5.875
Niles,Calif. P1 ....6.125
N.T'wanda,N.Y.(23)B11 5.775
Pittsburg,Calif.(9) C11.6.125
Pittsburgh(9) J5 ......5.425
Portland,Oreg. O4 .....6.175
Seattle B3, N14 ......6.175
S.Ch'c'go(9)R2,U5,W14 5.425
S.Duquesne,Pa.(9) U5..5.425
S.SanFran.,Calif.(9)B3 6.175
Sterling,Ill.(1)(9) N15..5.425
Sterling,Ill.(9) N15 ....5.525
Struthers,O. Y1 ....5.425
Tonawanda,N.Y. B12 ..5.425
Torrance,Calif.(9) C11.6.125
Youngstown(9) R2, U5.5.425

BARS, H.R. Leaded Alloy
(Including leaded extra)

Warren,O. C17 ....7.475

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.475
Bethlehem,Pa. B2 ....6.475
Bridgeport,Conn. C32 ..6.55
Buffalo R2 ....6.475
Canton,O. R2, T7 ....6.475
Clairton,Pa. U5 ......6.475
Detroit S41 ....6.475
Economy,Pa. B14 ....6.475
Ecorse,Mich. G5 ......6.575
Fairless,Pa. U5 ....6.625
Farrell,Pa. S3 ....6.475
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 ....6.475
Houston S5 ....6.725
Ind.Harbor,Ind. I-2, Y1 6.475
Johnstown,Pa. B2 ....6.475
KansasCity,Mo. S5 ....6.725
Lackawanna,N.Y. B2 .6.475
Lowellville,O. S3 .....6.475
LosAngeles B3 ....7.525
Massillon,O. R2 ......6.475
Midland,Pa. C18 .....6.475
Pittsburgh J5 ....6.475
Sharon,Pa. S3 ....6.475
S.Chicago R2, U5, W14 6.475
S.Duquesne,Pa. U5 ....6.475
Struthers,O. Y1 ......6.475
Waren,O. C17 ....6.475
Youngstown U5 ......6.475

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.925
Bessemer,Ala. T2 .....7.925
Bethlehem,Pa. B2 ....7.925
Clairton,Pa. U5 ......7.925
Cleveland R2 ....7.925
Ecorse,Mich. G5 ......8.025
Fairfield,Ala. T2 ......7.925
Fontana,Calif. K1 .....8.625
Gary,Ind. U5 ....7.925
Houston S5 ....8.175
Ind.Harbor,Ind. Y1 ...7.925
Johnstown,Pa. B2 ...7.925
KansasCity,Mo. S5 ....8.175
Lackawanna,N.Y. B2..7.925
LosAngeles B3 ....8.625
Pittsburgh J5 ....7.925
Seattle B3 ....8.675
S.Chicago,Ill. U5, W14 7.925
S.Duquesne,Pa. U5 ....7.925
S.SanFrancisco B3 ...8.675
Struthers,O. Y1 ....7.925
Youngstown U5 ....7.925

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.575
Houston(9) S5 ....5.675
KansasCity,Mo.(9) S5..5.675
Lackawanna(9) B2 ...5.425
Sterling,Ill. N15 ......5.525
Sterling,Ill.(1) N15 ...5.425
Tonawanda,N.Y. B12 ..5.425

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 .....5.425
Atlanta A11 ....5.625
Joliet,Ill. P22 ....5.425
Niles,Calif. P1 ....6.125
Pittsburgh J5 ....5.425
Portland,Oreg. O4 .....6.175
SanFrancisco S7 ......6.275
Seattle B3 ....6.175

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 ......6.55
Clairton,Pa. U5 ....6.55
Gary,Ind. U5 ....6.55
Houston S5 ....6.80
KansasCity,Mo. S5 ....6.80
Pittsburgh J5 ....6.55
Youngstown U5 ....6.55

BARS, C.F., Leaded Alloy
(Including leaded extra)

Ambridge,Pa. W18 ...9.925
BeaverFalls,Pa. M12 ..9.925
Camden,N.J. P13 .....10.10
Chicago W18 ....9.925
Cleveland C20 ....9.925
Elyria,O. W8 ....9.925
LosAngeles S30
(Grade A) 11.30
(Grade B) 11.80
LosAngeles P2 ....10.75
(Grade A)..........11.46
(Grade B)..........11.90
Monaca,Pa. S17 ......9.925
Newark,N.J. W18 .....10.10
SpringCity,Pa. K3 .....10.10
Warren,O. C17 ....9.925

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .....7.30
BeaverFalls,Pa. M12,R2 7.30
Birmingham C15 ......7.90
Bridgeport,Conn. C32 ..7.65
Buffalo B5 ....7.35
Camden,N.J. P13 .....7.75
Carnegie,Pa. C12 .....7.30
Chicago W18 ....7.30
Cleveland A7, C20 ....7.30
Detroit B5, P17 ....7.50
Detroit S41 ....7.30
Donora,Pa. A7 ....7.30
Elyria,O. W8 ....7.30
FranklinPark,Ill. N5 ...7.30
Gary,Ind. R2 ....7.30
GreenBay,Wis. F7 .....7.30
Hammond,Ind. J5, L2 ..7.30
Hartford,Conn. R2 .....7.80
Harvey,Ill. B5 ....7.30
LosAngeles (49) S30 ..8.75
LosAngeles P2, R2 ...8.75
Mansfield,Mass. B5 ....7.85
Massillon,O. R2, R8 ....7.30
Midland,Pa. C18 ......7.30
Monaca,Pa. S17 ....7.30
Newark,N.J. W18 .....7.75
NewCastle,Pa.(17) B4 ..7.30
Pittsburgh J5 ....7.30
Plymouth,Mich. P5 ....7.55
Putnam,Conn. W18 ....7.85
Readville,Mass. C14 ....7.85
S.Chicago,Ill. W14 ....7.30
SpringCity,Pa. K3 .....7.75
Struthers,O. Y1 ....7.30
Warren,O. C17 ....7.30
Willimantic,Conn. J5 ..7.80
Waukegan,Ill. A7 .....7.30
Youngstown F3, Y1 .....7.30

BARS, Cold-Finished Carbon
(Turned and Ground)

Cumberland,Md.(5) C19.6.55

BARS, Cold Finished Alloy

Ambridge,Pa. W18 ....8.775
BeaverFalls,Pa.M12,R2 8.775
Bethlehem,Pa. B2 ....8.775
Bridgeport,Conn. C32 ..8.925
Buffalo B5 ....8.775
Camden,N.J. P13 .....8.95
Canton,O. T7 ....8.775
Carnegie,Pa. C12 .....8.775
Chicago W18 ....8.775
Cleveland A7, C20 ....8.775
Detroit B5, P17 ......8.975
Detroit S41 ....8.775
Donora,Pa. A7 ....8.775
Elyria,O. W8 ....8.775
FranklinPark,Ill. N5 ..8.775
Gary,Ind. R2 ....8.775
GreenBay,Wis. F7 ....8.775
Hammond,Ind. J5, L2..8.775
Hartford,Conn. R2 ....9.075
Harvey,Ill. B5 ....8.775
Lackawanna,N.Y. B2 ..8.775
LosAngeles P2, S30....10.75
Mansfield,Mass. B5 ...9.075
Massillon,O. R2, R8 ..8.775
Midland,Pa. C18 ......8.775
Monaca,Pa. S17 ......8.775
Newark,N.J. W18 .....8.95
Plymouth,Mich. P5 ....8.975
S.Chicago,Ill. W14 ....8.775
SpringCity,Pa. K3 ....8.95
Struthers,O. Y1 ....8.775
Warren,O. C17 ....8.775
Waukegan,Ill. A7 .....8.775
Worcester,Mass. A7 ..9.075
Youngstown F3, Y1 ..8.775

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	5.425
Atlanta A11	5.625
Birmingham C15, S42	5.425
Buffalo R2	5.425
Cleveland R2	5.425
Ecorse,Mich. G5	5.775
Emeryville,Calif. J7	6.175
Fairfield,Ala. T2	5.425
Fairless,Pa. U5	5.575
Fontana,Calif. K1	6.125
Ft.Worth,Tex.(4)(26)T4	**5.875**
Gary,Ind. U5	5.425
Houston S5	5.675
Ind.Harbor,Ind. I-2, Y1	5.425
Johnstown,Pa. B2	5.425
Joliet,Ill. P22	5.425
KansasCity,Mo. S5	5.675
Lackawanna,N.Y. B2	5.425
LosAngeles B3	6.125
Milton,Pa. M18	5.575
Minnequa,Colo. C10	5.875
Niles,Calif. P1	6.125
Pittsburg,Calif. C11	6.125
Pittsburgh J5	5.425
Portland,Oreg. O4	6.175
SandSprings,Okla. S5	5.925
Seattle B3, N14	6.175
S.Chicago,Ill. R2	5.425
S.Duquesne,Pa. U5	5.425
S.SanFrancisco B3	6.175
SparrowsPoint,Md. B2	5.425
Sterling,Ill.(1) N15	5.425
Sterling,Ill. N15	5.525
Struthers,O. Y1	5.425
Tonawanda,N.Y. B12	6.00
Torrance,Calif. C11	6.125
Youngstown R2, U5	5.425

BARS, Reinforcing (Fabricated; to Consumers)

Boston B2	7.65
Chicago U8	6.91
Cleveland U8	6.89
Johnstown,Pa. B2	7.08
KansasCity,Mo. S5	7.35
Lackawanna,N.Y. B2	6.85
Marion,O. P11	6.70
Newark,N.J. U8	7.55
Philadelphia U8	7.38
Pittsburgh J5, U8	7.10
Seattle B3, N14	7.70
SparrowsPt.,Md. B2	7.08
St.Paul U8	7.92
Williamsport,Pa. S19	7.00

BARS, Wrought Iron

Economy,Pa.(S.R.)B14	14.45
Economy,Pa.(D.R.)B14	18.00
Economy,(Staybolt)B14	18.45

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2	5.325
ChicagoHts.(4)(44) I-2	5.425
ChicagoHts.(4) C2	5.425
Franklin,Pa. (3) F5	5.325
Franklin,Pa. (4) F5	5.425
JerseyShore,Pa.(3) J8	5.30
Marion,O.(3) P11	5.325
Tonawanda(3) R12	5.325
Tonawanda(4) B12	6.00
Williamsport,Pa.(3) S19	5.50

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala.City,Ala. R2	4.925
Allenport,Pa. P7	4.925
Ashland,Ky.(8) A10	4.925
Cleveland J5, R2	4.925
Conshohocken,Pa. A3	4.975
Detroit(8) M1	5.025
Ecorse,Mich. G5	5.025
Fairfield,Ala. T2	4.925
Fairless,Pa. U5	4.975
Fontana,Calif. K1	*5.675*
Gary,Ind. U5	4.925
Geneva,Utah C11	5.025
GraniteCity,Ill. (8)G4	5.125
Ind.Harbor,Ind. I-2, Y1	4.925
Irvin,Pa. U5	4.925
Lackawanna,N.Y. B2	4.925
Mansfield,O. E6	4.925
Munhall,Pa. U5	4.925
Newport,Ky.(8) A2	4.925
Niles,O. M21, S3	4.925
Pittsburg,Calif. C11	5.625
Pittsburgh J5	4.925
Portsmouth,O. P12	4.925
Riverdale,Ill. A1	4.925
Sharon,Pa. S3	4.925
S.Chicago,Ill. W14	4.925
SparrowsPoint,Md. B2	4.925
Steubenville,O. W10	4.925
Warren,O. R2	4.925
Weirton,W.Va. W6	4.925
Youngstown U5, Y1	4.925

SHEETS, H.R.,(19 Ga. & Lighter)

Niles,O. M21	6.05

SHEETS, H.R. Alloy

Gary,Ind. U5	8.10
Ind.Harbor,Ind. Y1	8.10
Irvin,Pa. U5	8.10
Munhall,Pa. U5	8.10
Newport,Ky. A2	8.10
Youngstown U5, Y1	8.10

SHEETS, H.R.(14 Ga. & Heavier) High-Strength, Low-Alloy

Cleveland J5, R2	7.275
Conshohocken,Pa. A3	7.325
Ecorse,Mich. G5	7.375
Fairfield,Ala. T2	7.275
Fairless,Pa. U5	7.325
Farrell,Pa. S3	7.275
Fontana,Calif. K1	*8.025*
Gary,Ind. U5	7.275
Ind.Harbor,Ind. I-2, Y1	7.275
Irvin,Pa. U5	7.275
Lackawanna (35) B2	7.275
Munhall,Pa. U5	7.275
Pittsburgh J5	7.275
S.Chicago,Ill. U5, W14	7.275
Sharon,Pa. S3	7.275
SparrowsPoint(36) B2	7.275
Warren,O. R2	7.275
Weirton,W.Va. W6	7.275
Youngstown U5, Y1	7.275

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10	5.175
Cleveland R2	5.675
Warren,O. R2	5.675

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	6.80
Middletown,O. A10	6.55
Warren,O. R2	6.80

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2	6.05
Allenport,Pa. P7	6.05
Cleveland J5, R2	6.05
Conshohocken,Pa. A3	6.10
Detroit M1	6.05
Ecorse,Mich. G5	6.15
Fairfield,Ala. T2	6.05
Fairless,Pa. U5	6.10
Follansbee,W.Va. F4	6.05
Fontana,Calif. K1	7.30
Gary,Ind. U5	6.05
GraniteCity,Ill. G4	6.25
Ind.Harbor,Ind. I-2, Y1	6.05
Irvin,Pa. U5	6.05
Lackawanna,N.Y. B2	6.05
Mansfield,O. E6	6.05
Middletown,O. A10	6.05
Newport,Ky. A2	6.05
Pittsburg,Calif. C11	7.00
Pittsburgh J5	6.05
Portsmouth,O. P12	6.05
SparrowsPoint,Md. B2	6.05
Steubenville,O. W10	6.05
Warren,O. R2	6.05
Weirton,W.Va. W6	6.05
Yorkville,O. W10	6.05
Youngstown Y1	6.05

SHEETS, Cold-Rolled High-Strength, Low-Alloy

Cleveland J5, R2	8.975
Ecorse,Mich. G5	9.075
Fairless,Pa. U5	9.025
Fontana,Calif. K1	10.275
Gary,Ind. U5	8.975
IndianaHarbor,Ind. Y1	8.975
Irvin,Pa. U5	8.975
Lackawanna(37) B2	8.975
Pittsburgh J5	8.975
SparrowsPoint (38) B2	8.975
Warren,O. R2	8.975
Weirton,W.Va. W6	8.975
Youngstown Y1	8.975

SHEETS, Culvert

	Cu Steel	Cu Fe
Ashland,Ky. A10	6.95	7.20
Canton,O. R2	6.95	7.45
Fairfield T2	6.95	7.20
Gary,Ind. U5	6.95	7.20
GraniteCity,Ill. G4	7.15	...
Ind.Harbor I-2	6.95	7.20
Irvin,Pa. U5	6.95	7.20
Kokomo,Ind. C16	7.05	...
MartinsFry. W10	6.95	7.20
Pitts.,Calif. C11	7.70	...
Pittsburgh J5	6.95	...
SparrowsPt. B2	6.95	...

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2	7.20

SHEETS, Galvanized Steel Hot-Dipped

Ala.City,Ala. R2	6.60‡
Ashland,Ky. A10	6.60†
Canton,O. R2	6.60‡
Dover,O. R1	6.60†
Fairfield,Ala. T2	6.60†
Gary,Ind. U5	6.60*
GraniteCity,Ill. G4	6.80*
Ind.Harbor,Ind. I-2	6.60†
Irvin,Pa. U5	6.60*
Kokomo,Ind. C16	6.70‡
MartinsFerry,O. W10	6.60*
Middletown,O. A10	6.60†
Pittsburg,Calif. C11	7.35*
Pittsburgh J5	6.60†
SparrowsPt.,Md. B2	6.60†
Warren,O. R2	6.60†
Weirton,W.Va. W6	6.60*

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*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1	*7.175*

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5	9.725
SparrowsPt.(39) B2	9.725

SHEETS, Galvannealed Steel

Canton,O. R2	7.00
Irvin,Pa. U5	7.00

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10	6.85
Middletown,O. A10	6.85

SHEETS, Electrogalvanized

Cleveland (28) R2	7.425
Niles,O. (28) R2	7.425
Weirton,W.Va. W6	7.275

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1)	9.25
Butler,Pa. A10 (type 2)	9.35

SHEETS, Enameling Iron

Ashland,Ky. A10	6.625
Cleveland R2	6.625
Gary,Ind. U5	6.625
GraniteCity,Ill. G4	6.825
Ind.Harbor,Ind. I-2, Y1	6.625
Irvin,Pa. U5	6.625
Middletown,O. A10	6.625
Niles,O. M21, S3	6.625
Youngstown Y1	6.625

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4	8.65
Ind.Harbor,Ind. I-2	8.475
Yorkville,O. W10	8.475

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	7.00
Gary,Ind. U5	7.00
Mansfield,O. E6	7.00
Middletown,O. A10	7.00
Niles,O. M21, S3	7.00
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	7.40

Key to Producers

A1	Acme Steel Co.
A2	Acme-Newport Steel Co
A3	Alan Wood Steel Co.
A4	Allegheny Ludlum Steel
A5	Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6	American Shim Steel Co.
A7	American Steel & Wire Div., U. S. Steel Corp.
A8	Anchor Drawn Steel Co.
A9	Angell Nail & Chaplet
A10	Armco Steel Corp.
A11	Atlantic Steel Co.
B1	Babcock & Wilcox Co.
B2	Bethlehem Steel Co.
B3	Beth. Pac. Coast Steel
B4	Blair Strip Steel Co.
B5	Bliss & Laughlin Inc.
B8	Braeburn Alloy Steel
B9	Brainard Steel Div., Sharon Steel Corp.
B10	E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B11	Buffalo Bolt Co., Div., Buffalo Eclipse Corp.
B12	Buffalo Steel Corp.
B14	A. M. Byers Co.
B15	J. Bishop & Co.
C1	Calstrip Steel Corp.
C2	Calumet Steel Div., Borg-Warner Corp.
C4	Carpenter Steel Co.
C7	Cleve.Cold Rolling Mills
C9	Colonial Steel Co.
C10	Colorado Fuel & Iron
C11	Columbia-Geneva Steel
C12	Columbia Steel & Shaft.
C13	Columbia Tool Steel Co.
C14	Compressed Steel Shaft.
C15	Connors Steel Div., H. K. Porter Co. Inc.
C16	Continental Steel Corp.
C17	Copperweld Steel Co.
C18	Crucible Steel Co.
C19	Cumberland Steel Co.
C20	Cuyahoga Steel & Wire
C22	Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23	Charter Wire Inc.
C24	G. O. Carlson Inc.
C32	CarpenterSteelofN.Eng.
D2	Detroit Steel Corp.
D3	Dearborn Div., Sharon Steel Corp.
D4	Disston Div., H. K. Porter Co. Inc.
D6	Driver-Harris Co.
D7	Dickson Weatherproof Nail Co.
D8	Damascus Tube Co.
D9	Wilbur B. Driver Co.
E1	EasternGas&FuelAssoc.
E2	Eastern Stainless Steel
E4	Electro Metallurgical Co.
E5	Elliott Bros. Steel Co.
E6	Empire Steel Corp.
F2	Firth Sterling Inc.
F3	Fitzsimmons Steel Co.
F4	Follansbee Steel Corp.
F5	Franklin Steel Div., Borg-Warner Corp.
F6	Fretz-Moon Tube Co.
F7	Ft. Howard Steel & Wire
F8	Ft. Wayne Metals Inc.
G4	Granite City Steel Co.
G5	Great Lakes Steel Corp.
G6	Greer Steel Co.
G8	Green River Steel Corp.
H1	Hanna Furnace Corp.
H7	Helical Tube Co.
I-1	Igoe Bros. Inc.
I-2	Inland Steel Co.
I-3	Interlake Iron Corp.
I-4	Ingersoll Steel Div., Borg-Warner Corp.
I-6	Ivins Steel Tube Works
I-7	Indiana Steel& Wire Co.
J1	Jackson Iron & Steel Co.
J3	Jessop Steel Co.
J4	Johnson Steel & Wire Co.
J5	Jones & Laughlin Steel
J6	Joslyn Mfg. & Supply
J7	Judson Steel Corp.
J8	Jersey Shore Steel Co
K1	Kaiser Steel Corp.
K2	Keokuk Electro-Metals
K3	Keystone Drawn Steel
K4	Keystone Steel & Wire
K7	Kenmore Metals Corp.
L1	Laclede Steel Co.
L2	LaSalle Steel Co.
L3	Latrobe Steel Co.
L6	Lone Star Steel Co.
L7	Lukens Steel Co.
M1	McLouth Steel Corp.
M4	Mahoning Valley Steel
M6	Mercer Pipe Div., Sawhill Tubular Products
M8	Mid-States Steel & Wire
M12	Moltrup Steel Products
M14	McInnes Steel Co.
M16	Md.Fine & Special. Wire
M17	Metal Forming Corp.
M18	Milton Steel Div., Merritt-Chapman&Scott
M21	Mallory-Sharon Titanium Corp.
M22	Mill Strip Products Co.
N1	National-Standard Co.
N2	National Supply Co.
N3	National Tube Div., U. S. Steel Corp.
N5	Nelsen Steel & Wire Co.
N6	New England High Carbon Wire Co.
N8	Newman-Crosby Steel
N9	Newport Steel Corp.
N14	Northwest. Steel Rolling Mills Inc.
N15	Northwestern S.&W. Co.
O4	Oregon Steel Mills
P1	Pacific States Steel Corp.
P2	Pacific Tube Co.
P4	Phoenix Iron & Steel Co., Sub. of Barium Steel Corp.
P5	Pilgrim Drawn Steel
P6	Pittsburgh Coke & Chem.
P7	Pittsburgh Steel Co.
P11	Pollak Steel Co.
P12	Portsmouth Div., Detroit Steel Corp.
P13	Precision Drawn Steel
P14	Pitts. Screw & Bolt Co.
P15	Pittsburgh Metallurgical
P16	Page Steel & Wire Div., Amer. Chain & Cable
P17	Plymouth Steel Corp.
P19	Pitts. Rolling Mills
P20	Prod. Steel Strip Corp.
P22	Phoenix Mfg. Co.
P24	Phil. Steel & Wire Corp.
R1	Reeves Steel & Mfg. Co.
R2	Republic Steel Corp.
R3	Rhode Island Steel Corp.
R5	Roebling's Sons, John A.
R6	Rome Strip Steel Co.
R8	Reliance Div.,EatonMfg.
R9	Rome Mfg. Co.
R10	Rodney Metals Inc.
S1	Seneca Wire & Mfg. Co.
S3	Sharon Steel Corp.
S4	Sharon Tube Co.
S5	Sheffield Div., Armco Steel Corp.
S6	Shenango Furnace Co.
S7	Simmons Co.
S8	Simonds Saw & Steel Co.
S12	Spencer Wire Corp.
S13	Standard Forgings Corp.
S14	Standard Tube Co.
S15	Stanley Works
S17	Superior Drawn Steel Co.
S18	Superior Steel Div., Copperweld Steel Co.
S19	Sweet's Steel Co.
S20	Southern States Steel
S23	Superior Tube Co.
S25	Stainless Welded Prod.
S26	Specialty Wire Co. Inc.
S30	Sierra Drawn Steel Corp.
S40	Seneca Steel Service
S41	Stainless Steel Div., J&L Steel Corp.
S42	Southern Elec. Steel Co.
T2	Tenn. Coal & Iron Div., U. S. Steel Corp.
T3	Tenn. Products & Chemical Corp.
T4	Texas Steel Co.
T5	Thomas Strip Div., Pittsburgh Steel Co.
T6	Thompson Wire Co.
T7	Timken Roller Bearing
T9	Tonawanda Iron Div., Am. Rad. & Stan. San.
T13	Tube Methods Inc.
T19	Techalloy Co. Inc.
U4	Universal-Cyclops Steel
U5	United States Steel Corp.
U6	U. S. Pipe & Foundry
U7	Ulbrich Stainless Steels
U8	U. S. Steel Supply Div., U. S. Steel Corp.
V2	Vanadium-Alloys Steel
V3	Vulcan Crucible Steel Div., H. K. Porter Co.
W1	Wallace Barnes Co.
W2	Wallingford Steel Co.
W3	Washburn Wire Co.
W4	Washington Steel Corp.
W6	Weirton Steel Co.
W8	Western Automatic Machine Screw Co.
W9	Wheatland Tube Co.
W10	Wheeling Steel Corp.
W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13	Wilson Steel & Wire Co.
W14	Wisconsin Steel Div., International Harvester
W15	Woodward Iron Co.
W18	Wyckoff Steel Co.
Y1	Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.925
Allenport,Pa. P7	4.925
Alton,Ill. L1	5.125
Ashland,Ky.(8) A10	4.925
Atlanta A11	5.125
Bessemer,Ala. T2	4.925
Birmingham C15	4.925
Buffalo (27) R2	4.925
Conshohocken,Pa. A3	4.975
Detroit M1	5.025
Ecorse,Mich. G5	5.025
Fairfield,Ala. T2	4.925
Fontana,Calif. K1	*5.675*
Gary,Ind. U5	4.925
Ind.Harbor,Ind. I-2, Y1	4.925
Johnstown,Pa. (25) B2	4.925
Lackaw'na,N.Y.(25) B2	4.925
LosAngeles(25) B3	5.675
Minnequa,Colo. C10	6.025
Pittsburg,Calif. C11	5.675
Riverdale,Ill. A1	4.925
SanFrancisco S7	6.35
Seattle(25) B3	6.35
Seattle N14	6.35
Sharon,Pa. S3	4.925
S.SanFrancisco(25) B3	5.675
SparrowsPoint,Md. B2	4.925
Sterling,Ill. (1) N15	4.925
Sterling,Ill. N15	5.025
Torrance,Calif. C11	5.675
Warren,O R2	4.925
Weirton,W.Va. W6	4.925
Youngstown U5	4.925

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18	8.10
Farrell,Pa. S3	8.10
Gary,Ind. U5	8.10
Houston S5	8.35
Ind.Harbor,Ind. Y1	8.10
KansasCity,Mo. S5	8.35
LosAngeles B3	9.30
Lowellville,O. S3	8.10
Newport,Ky. A2	8.10
Sharon,Pa. A2	8.10
S.Chicago,Ill. W14	8.10
Youngstown U5, Y1	8.10

STRIP, Hot-Rolled High-Strength, Low-Alloy

Bessemer,Ala. T2	7.325
Conshohocken,Pa. A3	7.325
Ecorse,Mich. G5	7.425
Fairfield,Ala. T2	7.325
Farrell,Pa. S3	7.325
Gary,Ind. U5	7.325
Ind.Harbor,Ind. I-2, Y1	7.325
Lackawanna,N.Y. B2	7.325
LosAngeles(25) B3	8.075
Seattle(25) B3	8.325
Sharon,Pa. S3	7.325
S.Chicago,Ill. W14	7.325
S.SanFrancisco(25)B3	8.075
SparrowsPoint,Md. B2	7.325
Warren,O. R2	7.325
Weirton,W.Va. W6	7.325
Youngstown U5, Y1	7.325

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	5.175
Warren,O. R2	5.675

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	7.15
Baltimore T6	7.15
Boston T6	7.70
Buffalo S40	7.15
Cleveland A7, J5	7.15
Conshohocken,Pa. A3	7.20
Dearborn,Mich. D3	7.25
Detroit D2, M1, P20	7.25
Dover,O. G6	7.15
Ecorse,Mich. G5	7.25
Evanston,Ill. M22	7.25
Follansbee,W.Va. F4	7.15
Fontana,Calif. K1	9.00
FranklinPark,Ill. T6	7.25
Ind.Harbor,Ind. Y1	7.15
Indianapolis J5	7.30
LosAngeles J5	9.05
LosAngeles C1	9.20
NewBedford,Mass. R10	7.60
NewBritain(10) S15	7.15
NewCastle,Pa. B4, E5	7.15
NewHaven,Conn. D2	7.60
NewKensington,Pa. A6	7.15
Pawtucket,R.I. R3	7.80
Pawtucket,R.I. N8	7.70
Philadelphia(45) P24	7.70
Pittsburgh J5	7.15
Riverdale,Ill. A1	7.25
Rome,N.Y. (32) R6	7.15
Sharon,Pa. S3	7.15
Trenton,N.J. (31) R5	8.60
Wallingford,Conn. W2	7.60
Warren,O. R2, T5	7.15
Weirton,W.Va. W6	7.15
Worcester,Mass. A7	7.70
Youngstown J5, Y1	7.15

STRIP, Cold-Rolled Alloy

Boston T6	15.40
Carnegie,Pa. S18	15.05
Cleveland A7	15.05
Dover,O. G6	15.05
Farrell,Pa. S3	15.05
FranklinPark,Ill. T6	15.05
Harrison,N.J. C18	15.05
Indianapolis J5	15.20
Lowellville,O. S3	15.05
Pawtucket,R.I. N8	15.40
Riverdale,Ill. A1	15.05
Sharon,Pa. S3	15.05
Worcester,Mass. A7	15.35
Youngstown J5	15.05

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.45
Dearborn,Mich. D3	10.60
Dover,O. G6	10.45
Ecorse,Mich. G5	10.55
Farrell,Pa. S3	10.50
Ind.Harbor,Ind. Y1	10.65
Sharon,Pa. S3	10.50
Warren,O. R2	10.45
Weirton,W.Va. W6	10.50
Youngstown Y1	10.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	7.90

STRIP, C.R. Electrogalvanized

Cleveland A7	7.15*
Dover,O. G6	7.15*
Evanston,Ill. M22	7.25*
Riverdale,Ill. A1	7.25*
Warren,O. B9, T5	7.15*
Worcester,Mass. A7	7.70*
Youngstown J5	7.15*

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*Plus galvanizing extras

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	7.275

TIGHT COOPERAGE HOOP

Atlanta A11	5.65
Riverdale,Ill. A1	5.50
Sharon,Pa. S3	5.35
Youngstown U5	5.35

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	...	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. D3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	8.95	10.40	12.60	....	....
Fostoria,O. S1	10.05	11.15	13.10	16.10	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	...	....	12.90	16.10	19.30
Indianapolis J5	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
Los Angeles J5	11.15	12.60	14.80	....	....
NewBritain,Conn.(10) S15	8.95	10.40	12.60	15.60	18.55
NewCastle,Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	...	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y.(32) R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	...	10.70	12.90	16.10	19.30
Wallingford,Conn. W2	9.40	10.70	12.90	15.90	18.75
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown J5	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.10	21.95	26.30
Buffalo W12	18.10	....	....
Fostoria,O. S1	18.30	22.15	....
FranklinPark,Ill. T6	18.45	22.30	26.65
Harrison,N.J. C18	18.10	21.95	26.30
NewYork W3	18.10	21.95	26.30
Palmer,Mass. W12	18.10	....	....
Trenton,N.J. R5	18.10	21.95	26.30
Worcester,Mass. A7, T6	18.10	21.95	26.30
Youngstown J5	18.45	22.30	26.65

SILICON STEEL

H.R.SHEETS(22 Ga.,cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	....	11.80	12.90	13.95
Mansfield,O. E6	9.625	11.10	11.80	12.90	13.95
Newport,Ky. A2	9.625	11.10	11.80	12.90	13.95
Niles,O M21, S3	9.625	11.10	11.80	12.90	....
Vandergrift,Pa. U5	....	11.10	11.80	12.90	13.95
Warren,O. R2	9.625	11.10	11.80	12.90	....
Zanesville,O. A10	....	11.10	11.80	12.90	13.95
Zanesville,O. A10 (SP Coils)	....	....	11.55	12.65	13.70

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.35	12.05	13.15	14.20
Brackenridge,Pa. A4	....	....	12.05	13.15	14.20
GraniteCity,Ill. G4	9.825*	11.05*	11.75*	12.85*	....
IndianaHarbor,Ind. I-2	9.625†	10.85*	11.55*	12.65*	....
Mansfield,O. E6	9.625*	11.35	12.05	13.15	14.20
Vandergrift,Pa. U5	9.625*	11.35	12.05	13.15	14.20
Warren,O. R2	9.625*	11.35	12.05	13.15	14.20
Zanesville,O. A10(FP Coils)	....	11.35	12.05	13.15	14.20

	Transformer Grades			
H.R. SHEETS (22Ga., cut lengths)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.00	15.55	16.05	17.10
Vandergrift,Pa. U5	14.75	15.55	16.05	17.10
Zanesville,O. A10	15.00	15.55	16.05	17.10

	Grain Oriented					
C.R. COILS & CUT LENGTHS (22 Ga.)	T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	17.60	19.20	19.70	20.20	....
Butler,Pa. A10	....	....	19.20	19.70	20.20	....
Vandergrift,Pa. U5	16.60	17.60	19.20	19.70	20.20	15.25**
Warren,O. R2	....	....	....	....	....	15.25‡

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*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$8.75	$9.00	$9.40
Fairfield,Ala. T2	8.85	9.10	9.50
Fairless,Pa. U5	8.85	9.10	9.50
Fontana,Calif. K1	9.50	9.75	10.15
Gary,Ind. U5	8.75	9.00	9.40
GraniteCity,Ill. G4	8.85	9.10	9.50
IndianaHarbor,Ind. I-2, Y1	8.75	9.00	9.40
Irvin,Pa. U5	8.75	9.00	9.40
Niles,O. R2	8.75	9.00	9.40
Pittsburg,Calif. C11	9.50	9.75	10.15
SparrowsPoint,Md. B2	8.85	9.10	9.50
Weirton,W.Va. W6	8.75	9.00	9.40
Yorkville,O. W10	8.75	9.00	9.40
ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	7.725	7.925	....
Niles,O. R2	7.725	7.925	8.125

TIN PLATE, American	1.25 lb	1.50 lb
Aliquippa,Pa.J5	$10.05	$10.30
Fairfield,Ala. T2	10.15	10.40
Fairless,Pa. U5	10.15	10.40
Fontana,Calif.K1	10.80	11.05
Gary,Ind. U5	10.05	10.30
Irvin,Pa. U5	10.05	10.30
Pitts.,Calif. C11	10.80	11.05
Sp.Pt.,Md. B2	10.15	10.40
Weirton,W.Va.W6	10.05	10.30
Yorkville,O. W10	10.05	10.30

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.85
Fairfield,Ala. T2	7.95
Fairless,Pa. U5	7.95
Fontana,Calif. K1	8.60
Gary,Ind. U5	7.85
GraniteCity,Ill. G4	7.95
Ind.Harbor,Ind. I-2,Y1	7.85
Irvin,Pa. U5	7.85
Niles,O. R2	7.85
Pittsburg,Calif. C11	8.60
SparrowsPoint,Md. B2	7.95
Weirton,W.Va. W6	7.85
Yorkville,O. W10	7.85

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa,Pa. J5	$7.50
Gary,Ind. U5	7.50
GraniteCity,Ill. G4	7.60
Ind.Harbor,Ind Y1	7.50
Irvin,Pa. U5	7.50
Yorkville,O. W10	7.50

MANUFACTURING TERNES (Special Coated, Base Box)

Gary,Ind. U5	$9.70
Irvin,Pa. U5	9.70

ROOFING SHORT TERNES (8 lb Coated, Base Box)

Gary,Ind. U5	$11.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	7.65
Aliquippa,Pa. J5	7.65
Alton,Ill. L1	7.85
Atlanta A11	7.85
Bartonville,Ill. K4	7.75
Buffalo W12	7.65
Chicago W13	7.65
Cleveland A7, C20	7.65
Crawfordsville,Ind. M8	7.75
Donora,Pa. A7	7.65
Duluth A7	7.65
Fairfield,Ala. T2	7.65
Fostoria,O.(24) S1	7.75
Houston S5	7.90
Jacksonville,Fla. M8	8.00
Johnstown,Pa. B2	7.65
Joliet,Ill A7	7.65
KansasCity,Mo. S5	7.90
Kokomo,Ind. C16	7.75
LosAngeles B3	8.60
Minnequa,Colo. C10	7.90
Monessen,Pa. P7, P16	7.65
N.Tonawanda,N.Y. B11	7.65
Palmer,Mass. W12	7.95
Pittsburg,Calif. C11	8.60
Portsmouth,O. P12	7.65
Rankin,Pa. A7	7.65
S.Chicago,Ill. R2	7.65
S.SanFrancisco C10	8.60
SparrowsPoint,Md. B2	7.75
Sterling,Ill.(1) N15	7.65
Sterling,Ill. N15	7.75
Struthers,O. Y1	7.65
Waukegan,Ill. A7	7.65
Worcester,Mass. A7	7.95

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	12.65
Buffalo W12	12.65
Cleveland A7	12.65
Donora,Pa. A7	12.65
Duluth A7	12.65
Johnstown,Pa. B2	12.65
Minnequa,Colo. C10	12.775
Monessen,Pa. P16	12.65
Muncie,Ind. I-7	12.85
NewHaven,Conn. A7	12.95
Palmer,Mass. W12	12.95
Pittsburg,Calif. C11	13.45
Portsmouth,O. P12	12.65
Roebling,N.J. R5	12.95
SparrowsPt.,Md. B2	12.75
Struthers,O. Y1	12.65
Trenton,N.J. A7	12.95
Waukegan,Ill. A7	12.65
Worcester,Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
NewHaven,Conn. A7	9.60
Palmer,Mass. W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,Mass. A7	9.60

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	9.30
Alton,Ill. L1	9.50
Bartonville,Ill. K4	9.40
Buffalo W12	9.30
Cleveland A7	9.30
Donora,Pa. A7	9.30
Duluth A7	9.30
Fostoria,O. S1	9.35
Johnstown,Pa. B2	9.30
KansasCity,Mo. S5	9.55
LosAngeles B3	10.25
Milbury,Mass.(12) N6	9.60
Minnequa,Colo. C10	9.50
Monessen,Pa. P7, P16	9.30
Muncie,Ind. I-7	9.50
Palmer,Mass.(12) W12	9.60
Pittsburg,Calif. C11	10.25
Portsmouth,O. P12	9.30
Roebling,N.J. R5	9.60
S.Chicago,Ill. R2	9.30
S.SanFrancisco C10	10.25
SparrowsPt.,Md. B2	9.40
Struthers,O. Y1	9.30
Trenton,N.J. A7	9.60
Waukegan,Ill. A7	9.30
Worcester,A7, J4, T6	9.60

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1	15.80
Bartonville,Ill. K4	15.70
Buffalo W12	15.60
Chicago W13	15.60
Cleveland A7	15.60
Crawfordsville,Ind. M8	15.70
Fostoria,O. S1	15.60
Houston S5	15.85
Jacksonville,Fla. M8	15.95
Johnstown,Pa. B2	15.60
KansasCity,Mo. S5	15.85
Kokomo,Ind. C16	15.60
Minnequa,Colo. C10	15.85
Monessen,Pa. P7, P16	15.60
Muncie,Ind. I-7	15.80
Palmer,Mass. W12	15.90
S.SanFrancisco C10	16.45
Waukegan,Ill. A7	15.60
Worcester,Mass. A7, T6	15.90

ROPE WIRE

Bartonville,Ill. K4	12.75
Buffalo W12	12.75
Fostoria,O. S1	12.75
Johnstown,Pa. B2	12.75
Monessen,Pa. P7	12.75
Muncie,Ind. I-7	12.95
Palmer,Mass. W12	13.05
Portsmouth,O. P12	12.75
Roebling,N.J. R5	13.05
SparrowsPt.,Md. B2	12.85
Struthers,O. Y1	12.75
Worcester,Mass. J4	13.05

(A) Plow and Mild Plow; add 0.25c for Improved Plow

WIRE, Tire Bead

Bartonville,Ill. K4	16.55
Monessen,Pa. P16	16.55
Roebling,N.J. R5	17.05

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	11.65
Baltimore T6	11.95
Boston T6	11.95
Buffalo W12	11.65
Chicago W13	11.75
Cleveland A7	11.65
Crawfordsville,Ind. M8	11.65
Dover,O. G6	11.65
Fostoria,O. S1	11.65
FranklinPark,Ill. T6	11.75
Kokomo,Ind. C16	11.65
Massillon,O. R8	11.65
Milwaukee C23	11.85
Monessen,Pa. P7, P16	11.65
Palmer,Mass. W12	11.95
Pawtucket,R.I. N8	11.95
Philadelphia P24	11.95
Riverdale,Ill. A1	11.75
Rome,N.Y. R6	11.65
Sharon,Pa. S3	11.65
Trenton,N.J. R5	11.95
Warren,O. B9	11.65
Worcester,Mass. A7, T6	11.95

NAILS, Stock	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville, Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla.(20) M8	184
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers; per cwt)

Galveston,Tex. D7	$9.10

NAILS, Cut (100 lb keg)
To Dealers (33)

Conshohocken,Pa. A3	$9.80
Wheeling,W.Va. W10	9.80

POLISHED STAPLES	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	175
Atlanta A11	177
Bartonville,Ill. K4	177
Crawfordsville,Ind M8	177
Donora,Pa. A7	175
Duluth A7	175
Fairfield,Ala. T2	175
Jacksonville,Fla.(20) M8	186
Johnstown,Pa. B2	175
Joliet,Ill. A7	175
Kokomo,Ind. C6	177
Minnequa,Colo. C10	180
Pittsburg,Calif. C11	194
Rankin,Pa. A7	175
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler
(14½ Ga.)(Per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$10.26
Atlanta A11	10.36
Bartonville,Ill. K4	10.36
Buffalo W12	10.26
Chicago W13	10.26
Crawfordsville,Ind. M8	10.36
Donora,Pa. A7	10.26
Duluth A7	10.26
Fairfield,Ala T2	10.26
Houston S5	10.51
Jacksonville,Fla. M8	10.82
Johnstown,Pa. B2	10.26
Joliet,Ill. A7	10.26
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	10.36
LosAngeles B3	11.05
Minnequa,Colo. C10	10.51
Pittsburg,Calif. C11	11.04
S.Chicago,Ill. R2	10.26
S.SanFrancisco C10	11.04
SparrowsPt.,Md. B2	10.36
Sterling,Ill.(37) N15	10.36

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$10.60
Atlanta A11	10.70
Bartonville,Ill. K4	10.70
Buffalo W12	10.60
Chicago W13	10.60
Crawfordsville,Ind. M8	10.70
Donora,Pa. A7	10.60
Duluth A7	10.60
Fairfield,Ala T2	10.60
Houston S5	10.85
Jacksonville,Fla. M8	11.16
Johnstown,Pa. B2	10.60
Joliet, Ill. A7	10.60
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	10.70
LosAngeles B3	11.40
Minnequa,Colo. C10	10.85
Pittsburg,Calif. C11	11.40
S.Chicago,Ill. R2	10.60
S. SanFrancisco C10	11.40
SparrowsPt., Md. B2	10.70
Sterling,Ill.(37) N15	10.70

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$10.65
Atlanta A11	10.75
Bartonville,Ill. K4	10.75
Buffalo W12	10.65
Chicago W13	10.65
Crawfordsville,Ind. M8	10.75
Donora,Pa. A7	10.65
Duluth A7	10.65
Fairfield,Ala. T2	10.65
Houston S5	10.90
Jacksonville,Fla. M8	11.21
Johnstown,Pa. B2	10.65
Joliet,Ill. A7	10.65
KansasCity,Mo. S5	10.90
Kokomo,Ind. C16	10.75
LosAngeles B3	11.45
Minnequa,Colo. C10	10.90
Pittsburg,Calif. C11	11.45
S.Chicago,Ill. R2	10.65
S.SanFrancisco C10	11.45
SparrowsPt.,Md. B2	10.75
Sterling,Ill(37) N15	10.75

BALE TIES, Single Loop	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	219
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg, Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md B2	214
Sterling,Ill.(7) N15	214
Williamsport,Pa. S19	175

FENCE POSTS

Birmingham C15	171
ChicagoHts.,Ill. C2, I-2	172
Duluth A7	172
Franklin,Pa. F5	172
Huntington,W.Va. C15	171
Johnstown,Pa. B2	172
Marion,O. P11	172
Minnequa,Colo. C10	177
Sterling,Ill.(1) N15	172
Tonawanda,N.Y. B12	174

WIRE, Barbed	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198*
Bartonville,Ill. K4	198
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	203
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196*
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198§

WOVEN FENCE, 9-15 Ga.	Col.
Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-14½ga.J5	190§
Atlanta A11	192*
Bartonville,Ill. K4	192
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	197
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192§

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.15	18.70**
Aliq'ppa,Pa. J5	17.15	18.95
Bartonville K4	17.25	19.05
Cleveland A7	17.15	....
Crawf'dsville M8	17.25	19.05
Fostoria,O. S1	17.65	19.20†
Houston S5	17.40	18.95**
Jacksonville M8	17.50	19.30
Johnstown B2	17.15	18.95§
Kan.City,Mo. S5	17.40	....
Kokomo C16	17.25	18.80†
Minnequa C10	17.40	18.95**
P'lm'r,Mass.W12	17.45	19.00†
Pitts.,Calif. C11	17.50	19.05†
SparrowsPt. B2	17.25	19.05§
Sterling(37)N15	17.25	19.05§
Waukegan A7	17.15	18.70†
Worcester A7	17.45	....

WIRE, Merchant Quality

(6 to 8 gage)	An'ld	Galv.
Ala.City,Ala. R2	8.65	9.20**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	8.75	9.425*
Bartonville(48) K4	8.75	9.425
Buffalo W12	8.65	9.20†
Cleveland A7	8.65	....
Crawfordsville M8	8.75	9.425
Donora,Pa. A7	8.65	9.20†
Duluth A7	8.65	9.20†
Fairfield T2	8.65	9.20†
Houston(48) S5	8.90	9.45**
Jacks'ville,Fla. M8	9.00	9.675
Johnstown B2(48)	8.65	9.325§
Joliet,Ill A7	8.65	9.20†
Kans.City(48) S5	8.90	9.45**
Kokomo C16	8.75	9.30†
LosAngeles B3	9.60	10.275§
Minnequa C10	8.90	9.45**
Monessen P7(48)	8.65	9.25*
Palmer,Mass. W12	8.95	9.50†
Pitts.,Calif. C11	9.60	10.15†
Rankin,Pa. A7	8.65	9.20†
S.Chicago R2	8.65	9.20**
S.SanFran. C10	9.60	10.15**
Spar'wsPt.B2(48)	8.75	9.425§
Sterling(48) N15	8.90	9.575§
Sterling(1)(48)	8.80	9.475§
Struthers,O (48)Y1	8.65	9.30‡
Worcester,Mass.A7	8.95	9.50†

Based on zinc price of: *13.50. †5c. §10c. ‡Less than 10c. ††10.50c. **Subject to zinc equalization extras.

FASTENERS

(Base discounts, full container quantity, per cent off list, f.o.b. mill)

BOLTS

Carriage, Machine Bolts

Full Size Body (cut thread)

½ in. and smaller:	
6 in. and shorter	49.0
Longer than 6 in.	39.0
⅝ in. thru 1 in.:	
6 in. and shorter	39.0
Longer than 6 in.	35.0
1⅛ in. and larger:	
All lengths	35.0

Undersized Body (rolled thread)

½ in. and smaller:	
6 in. and shorter	49.0

Carriage, Machine, Lag Bolts Hot Galvanized:

½ in. and smaller:	
6 in. and shorter	29.0
Longer than 6 in.	15.0
⅝ in. and larger:	
All lengths	12.0

Lag Bolts (all diam.)

6 in. and shorter	49.0
Longer than 6 in.	39.0

Plow and Tap Bolts

½ in. and smaller by 6 in. and shorter	49.0
Larger than ½ in. or Longer than 6 in.	39.0
Blank Bolts	39.0
Step, Elevator, Tire Bolts	49.0

Stove Bolts, Slotted:

⅛ to ¼ in. incl., 3 in. and shorter	55.0
5/16 to ½ in., inclusive	55.0

NUTS

Reg. & Heavy Square Nuts:	
All sizes	55.5
Square Nuts, Reg. & Heavy, Hot Galvanized:	
All sizes	41.0
Hex Nuts, Reg. & Heavy, Hot Pressed:	
¾ in. and smaller	60.5
⅞ in. to 1 in., incl.	55.5
1⅛ in. to 1½ in., incl.	58.5
1⅝ in. and larger	53.5
Hex Nuts, Reg. & Heavy, Cold Punched:	
¾ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5
Hex Nuts, All Types, Hot Galvanized:	
¾ in. and smaller	46.5
⅞ in. to 1 in., incl.	41.5
1⅛ in. to 1½ in., incl.	46.5
Hex Nuts, Semifinished, Heavy (Incl. Slotted):	
¾ in. and smaller	60.5
⅞ in. to 1½ in., incl.	55.5
1⅝ in. and larger	53.5
Hex Nuts, Finished (Incl. Slotted and Castellated):	
1 in. and smaller	63.0
1⅛ in. to 1½ in., incl.	59.0
1⅝ in. and larger	53.5
Semifinished Hex Nuts, Reg. (Incl. Slotted):	
⅝ in. and smaller	60.5
¾ in. to 1 in., incl.	63.0
1⅛ in. to 1½ in., incl.	59.0
1⅝ in. and larger	53.5

CAP AND SETSCREWS

(Base discounts, packages, per cent off list, f.o.b. mill)

Hex Head Capscrews, Coarse or Fine Thread, Bright:

6 in. and shorter:	
⅝ in. and smaller	40.0
¾, ⅞, and 1 in. diam.	22.0
Longer than 6 in.:	
⅝ in. and smaller	8.0
¾, ⅞, and 1 in. diam.	+6.0

High Carbon, Heat Treated:

6 in. and shorter:	
⅝ in. and smaller	26.0
¾, ⅞, and 1 in. diam.	3.0
Longer than 6 in.:	
⅝ in. and smaller	+13.0
¾, ⅞, and 1 in. diam.	+32.0

Flat Head Capscrews:

¾ in. and smaller	+76.0

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam.:	
6 in. and shorter	Net
Longer than 6 in.	+23

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.25

7/16 in. under: List less 19%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D.	B.W.	Seamless		Elec. Weld
In.	Gage	H.R.	C.D.	H.R.
1	13	....	25.98	23.54
1¼	13	....	30.78	23.36
1½	13	29.03	34.01	25.83
1¾	13	34.29	40.18	30.51
2	13	38.44	45.05	34.20
2¼	13	43.29	50.75	38.52
2¼	12	46.99	55.06	41.81
2½	12	51.76	60.65	46.05
2¾	12	56.04	65.67	49.88
3	12	59.76	70.03	53.19

RAILWAY MATERIALS

	Standard			Tee Rails
			All	60 lb
Rails	**No. 1**	**No. 2**	**No. 2**	**Under**
Bessemer,Pa. U5	5.525	5.425	....	6.50
Ensley,Ala. T2	5.525	5.425	....	6.50
Fairfield,Ala. T2	....	....	....	6.50
Gary,Ind. U5	5.525	5.425	....	...
Huntington,W.Va. C15	....	....	....	6.50
IndianaHarbor,Ind. I-2	5.525	5.425	5.475	...
Johnstown,Pa. B2	....	....	...	(16)6.50
Lackawanna,N.Y. B2	5.525	5.425	....	6.50
Minnequa,Colo. C10	5.525	5.425	....	7.00
Steelton,Pa. B2	5.525	5.425	....	...
Williamsport,Pa. S19	....	....	....	6.50

TIE PLATES

Fairfield,Ala. T2	6.60
Gary,Ind. U5	6.60
Ind.Harbor,Ind. I-2	6.60
Lackawanna,N.Y. B2	6.60
Minnequa,Colo. C10	6.60
Seattle B3	6.75
Steelton,Pa. B2	6.60
Torrance,Calif. C11	6.75

JOINT BARS

Bessemer,Pa. U5	6.975
Fairfield,Ala. T2	6.975
Ind.Harbor,Ind. I-2	6.975
Joliet,Ill. U5	6.975
Lackawanna,N.Y. B2	6.975
Minnequa,Colo. C10	6.975
Steelton,Pa. B2	6.975

AXLES

Ind.Harbor,Ind. S13	8.775
Johnstown,Pa. B2	8.775

TRACK BOLTS, Untreated

Cleveland R2	14.75
KansasCity,Mo. S5	14.75
Lebanon,Pa. B2	14.75
Minnequa,Colo. C10	14.75
Pittsburgh P14	14.75
Seattle B3	15.25

SCREW SPIKES

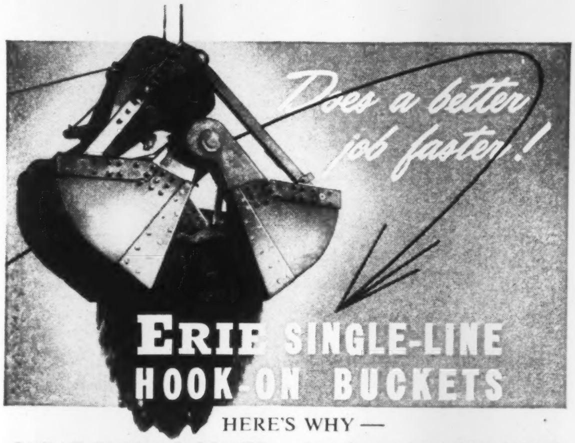
Lebanon,Pa. B2	14.50

STANDARD TRACK SPIKES

Fairfield,Ala. T2	9.75
Ind.Harbor,Ind. I-2, Y1	9.75
KansasCity,Mo. S5	9.75
Lebanon,Pa. B2	9.75
Minnequa,Colo. C10	9.75
Pittsburgh J5	9.75
Seattle B3	10.25
S.Chicago,Ill. R2	9.75
Struthers,O. Y1	9.75
Youngstown R2	9.75

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Chicago or Birm. base.
(7) Chicago base 2 cols. lower.
(8) 13 Ga. and heavier.
(9) Merchant quality; and 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass. base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) Plus 1c per 100 lb.
(21) New Haven, Conn. base.
(22) Deld. San Francisco Bay area.
(23) Special quality.
(24) Deduct 0.15c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.60c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.685c.
(43) 9-14½ Ga.
(44) To fabricators.
(45) 0.022 in. and lighter, over 0.022", 8.20c.
(48) 6-7Ga.
(49) 3½ in. and smaller rounds; 9.30c, over 3½ in. and other shapes.



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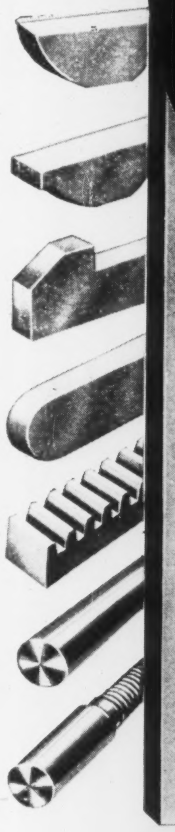

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Cleveland, O. Los Angeles, Calif.

S-2

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Ambridge, Pa. N2	+9.25	....	+2.75	....	+0.25	....	1.25	....	1.25	....	1	....	3.5	....
Lorain, O. N3	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25
Youngstown Y1	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

ELECTRIC STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+9.25	+24.25	+2.75	+19.5	+0.25	+17	1.25	+15.5	1.25	+15.5	1	+15.75	3.5	+13.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Alton, Ill. L1	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Benwood, W. Va. W10	4.5	+22	+7.5	+31	+18	+39.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Butler, Pa. F6	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Fairless, Pa. N3	....	....	....	....	....	....	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Fontana, Calif. K1	....	....	....	....	....	....	+8.25	+23.5	+5.25	+19.5	+1.75	+15	0.75	+14.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	4.25	+11	7.25	+7	10.75	+2.5	13.25	+3.25
Lorain, O. N3	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sharon, Pa. S4	5.5	+21	+6.5	+30	+17	+38.5	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Sparrows Pt., Md. B2	3.5	+23	+8.5	+32	+19	+40.5	3.25	+12	6.25	+8	9.75	+3.5	12.25	+2.75
Wheatland, Pa. W9	5.5	+21	+6	+30	+17	+38.5	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75
Youngstown R2, Y1	....	....	....	....	....	....	5.25	+10	8.25	+6	11.75	+1.5	14.25	+0.75

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Alton, Ill. L1	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	....	....	....	....
Benwood, W. Va. W10	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Etna, Pa. N2	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Fairless, Pa. N3	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Fontana, Calif. K1	1.25	+13.25	1.75	+12.75	3.25	+13	3.25	+13	+7.25	+24	+7.25	+24
Indiana Harbor, Ind. Y1	13.75	+0.75	14.25	+0.25	15.75	+0.5	15.25	+0.5	5.25	+11.5	5.25	+11.5
Lorain, O. N3	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sharon, Pa. M6	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	....	....	....	....
Sparrows Pt., Md. B2	12.75	+1.75	13.25	+1.25	14.75	+1.5	14.75	+1.5	4.25	+12.5	4.25	+12.5
Wheatland, Pa. W9	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5
Youngstown R2, Y1	14.75	0.25	15.25	0.75	16.75	0.5	16.75	0.5	6.25	+10.5	6.25	+10.5

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*Galvanized pipe discounts based on current price of zinc (10.00c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.00	27.00	....	36.00	....	42.00	44.25	48.50	45.00
202	23.75	30.25	36.50	39.00	40.75	43.00	45.00	49.25	49.25
301	23.25	28.00	37.25	37.25	42.00	44.25	46.25	51.25	47.50
302	25.25	31.50	38.00	40.50	42.75	45.00	47.25	52.00	52.00
302B	25.50	32.75	40.75	45.75	45.00	47.25	49.50	57.00	57.00
303	...	32.00	41.00	....	45.50	48.00	50.00	56.75	56.75
304	27.00	33.25	40.50	44.25	45.25	47.75	50.75	55.50	55.50
304L	...	....	48.25	51.50	53.00	55.50	58.50	63.25	63.25
305	28.50	36.75	42.50	47.50	45.25	47.75	51.25	58.75	58.75
308	30.75	38.25	47.25	50.25	52.75	55.75	60.25	63.00	63.00
309	39.75	49.50	57.75	64.50	63.75	67.00	71.00	80.50	80.50
310	49.75	61.50	78.00	84.25	86.50	91.00	92.75	96.75	96.75
314	...		....	....	86.50	....	92.75	....	104.50
316	39.75	49.50	62.25	69.25	69.25	73.00	76.75	81.50	81.50
316 L	....	...	70.00	76.50	77.00	80.75	84.50	89.25	89.25
317	48.00	60.00	76.75	88.25	86.25	90.75	93.50	101.00	101.00
321	32.25	40.00	47.00	53.50	52.50	55.50	59.75	65.50	65.50
330	...	....	106.75	....	106.75	106.75	105.50	108.00	149.25
18-8 CbTa	37.00	46.50	55.75	63.50	61.50	64.75	69.75	79.25	79.25
403	...	....	32.00	....	35.75	37.75	40.25	48.25	48.25
405	19.50	25.50	29.75	36.00	33.50	35.25	37.50	46.75	46.75
410	16.75	21.50	28.25	31.00	32.00	33.75	35.00	40.25	40.25
416	....	...	28.75	....	32.50	34.25	36.25	48.25	48.25
420	...	33.50	34.25	41.75	39.25	41.25	45.25	62.00	62.00
430	17.00	21.75	28.75	32.00	32.50	34.25	36.00	40.75	40.75
430F	...	....	29.50	....	33.00	34.75	36.75	51.75	51.75
431	...	28.75	37.75	....	42.00	44.25	46.00	56.00	56.00
446	...	....	39.25	59.00	44.25	46.50	47.75	70.00	70.00

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McInnes Steel Co.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels Inc.; U. S. Steel Corp.; Universal-Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel Co., subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.

Clad Steel

	—Plates— Carbon Base 5%	10%	15%	20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	34.70	37.95	42.25	46.70	40.00
304L	36.90	40.55	45.10	49.85	....
316	40.35	44.40	49.50	54.50	58.75
316L	45.05	49.35	54.70	60.10	....
316 Cb	47.30	53.80	61.45	69.10	....
321	36.60	40.05	44.60	49.30	47.25
347	38.25	42.40	47.55	52.80	57.00
405	28.60	29.85	33.35	36.85	....
410	28.15	29.55	33.10	36.70	....
430	28.30	29.80	33.55	37.25	....
Inconel	48.90	59.55	70.15	80.85	....
Nickel	41.65	51.95	62.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....
Copper*	....	....	....	....	46.00

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	33.95	40.25

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*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.305	Cr-Hot Work	0.475
Extra Carbon	0.360	W-Cr Hot Work	0.500
Special Carbon	0.475	V-Cr Hot Work	0.520
Oil Hardening	0.475	Hi-Carbon-Cr	0.925

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.285
18.25	4.25	1	4.75	...	2.500
18	4	2	9	...	2.870
18	4	2	....	...	1.960
18	4	1	....	...	1.795
9	3.5	..	....	...	1.395
13.5	4	3	....	...	2.060
13.75	3.75	2	5	...	2.440
6.4	4.5	1.9	....	5	1.300
6	4	3	....	6	1.545
1.5	4	1	....	8.5	1.155

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Ores

Lake Superior Iron Ore

(Prices effective for the 1957 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 30, 1957, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, foundry and basic 62-64% concentrates	25.00-27.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	27.00-27.50
N. African hematite (spot)	nom.
Brazilian iron ore, 68-69%	28.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$13.00-14.00*
Domestic, concentrates f.o.b. milling points	20.00-22.00

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*Before duty.

Manganese Ore

Mn 46-48%, Indian (export tax included), $1.39-1.42 per long ton unit, c.i.f. U. S. ports, duty for buyer's account: other than Indian, nominal; contracts by negotiation.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wish.

Indian and Rhodesian

48% 3:1	$51.00-53.00
48% 2.8:1	48.00-50.00
48% no ratio	41.00-43.00

South African Transvaal

48% no ratio	$40.00-41.00
44% no ratio	30.00-30.50

Turkish

48% 3:1	$55.00-57.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked	$1.18

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.60
60-65%	2.60-2.90

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., $135; Salina, Pa., $140; Niles, Ohio, $138; Cutler, Utah, $165.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Pa., New Savage, Md., St. Louis, $175; Stevens Pottery, Ga., $185; Cutler, Utah, $233.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., $150; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $155; E. Chicago, Ind., Joliet, Rockdale, Ill., $160; Lehigh, Utah, $175; Los Angeles, $180.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $157; Morrisville, Hays, Latrobe, Pa., $160; E. Chicago, Ind., $167; Curtner, Calif., $182.

Semisilica Brick (per 1000)

Clearfield, Pa., $140; Philadelphia, $137; Woodbridge, N. J., $135.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $235; Danville, Ill., $238; Philadelphia, Clearfield, Pa., $230; Orviston, Pa., $245.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $295; Danville, Ill., $298; Philadelphia, Clearfield, Orviston, Pa., $305.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $335; Danville, Ill., $338; Philadelphia, Clearfield, Orviston, Pa., $345.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $188.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., St. Louis, $310.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.75
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$28.85
Cincinnati, deld.	31.84
Buffalo, ovens	30.50
Camden, N. J., ovens	29.50
Detroit, ovens	30.50
Pontiac, Mich., deld.	32.25
Saginaw, Mich., deld.	33.83
Erie, Pa., ovens	30.50
Everett, Mass., ovens:	
New England, deld.	31.55*
Indianapolis, ovens	29.75
Ironton, Ohio, ovens	29.00
Cincinnati, deld.	31.84
Kearny, N. J., ovens	29.75
Milwaukee, ovens	30.50
Neville Island (Pittsburgh), Pa., ovens	29.25
Painesville, Ohio, ovens	30.50
Cleveland, deld.	32.69
Philadelphia, ovens	29.50
St. Louis, ovens	31.50
St. Paul, ovens	29.75
Chicago, deld.	33.24
Swedeland, Pa., ovens	29.50
Terre Haute, Ind., ovens	29.75

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*Or within $4.85 freight zone from works.

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LANSDOWNE 2, PENNA.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal transportation tax.

	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham District				
AlabamaCity,Ala. R2	62.00	62.50	..	....
Birmingham R2	62.00	62.50‡	...	...
Birmingham U6	...	62.50‡	66.50	...
Woodward,Ala. W15	62.00**	62.50‡	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N.Tonawanda,N.Y. T9	....	66.50	67.00	67.50
Tonawanda,N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	...
Rochester,N.Y., deld.	69.02	69.52	70.02	...
Syracuse,N.Y., deld.	70.12	70.62	71.12	
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S.Chicago,Ill. R2	66.00	...	66.50	....
S.Chicago,Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.62	69.12	69.12	69.62
Muskegon,Mich., deld	...	74.12	74.12	...
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron,Ohio, deld.	69.12	69.62	69.62	70.12
Mid-Atlantic District				
Birdsboro,Pa. B10	68.00	68.50	69.00	69.50
Chester,Pa. P4	66.50	67.00	67.50	....
Swedeland,Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.10	75.60	....
Newark,N.J., deld.	72.29	72.79	73.29	73.79
Philadelphia, deld.	70.01	70.51	71.01	71.59
Troy,N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
NevilleIsland,Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	...	67.95	67.95	68.48
McKeesRocks,Pa., deld.	...	67.60	67.60	68.13
Lawrenceville,Homestead, Wilmerding,Monaca,Pa., deld.	...	68.26	68.26	68.79
Verona,Trafford,Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge,Pa., deld.	68.60	69.10	69.10	69.63
Midland,Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard,Ohio Y1	....	....	66.50	....
Sharpsville,Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	67.00
Mansfield,Ohio, deld.	70.90	....	71.40	71.90
Duluth I-3	66.00	66.50	66.50	67.00
Erie,Pa. I-3	66.00	66.50	66.50	67.00
Everett,Mass. E1	67.50	68.00	68.50	....
Fontana,Calif. K1	75.00	75.50	....	....
Geneva,Utah C11	66.00	66.50	....	....
GraniteCity,Ill. G4	67.90	68.40	68.90	....
Ironton,Utah C11	66.00	66.50	....	....
Minnequa,Colo. C10	68.00	68.50	69.00	....
Rockwood,Tenn. T3	....	62.50‡	66.50	....
Toledo,Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.54	73.04	....	....

**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.

‡Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson,Ohio I-3, J1	78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

CalvertCity,Ky. P15	$99.00
NiagaraFalls,N.Y. P15	99.00
Keokuk,Iowa Open-hearth & Fdry. $9 freight allowed K2	103.50
Keokuk,Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, max fr'gt allowed up to $9, K2	106.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$78.50
Troy,N.Y. R2 (Phos. 0.035% max)	74.00
Philadelphia, deld.	82.27
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
NevilleIsland,Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00

Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb **except: Moline,** Norfolk, Richmond, Washington, 20 cents; **Baltimore, Bos**ton, Los Angeles, New York, Philadelphia, Portland, **Spokane, San Francisco,** 10 cents; **Atlanta, Chattanooga, Houston, Seattle,** no charge.

	SHEETS				STRIP	BARS			Standard	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Rounds	C.F. Rds.‡	H.R. Alloy 4140††[5]	Structural Shapes	Carbon	Floor
Atlanta	8.59§	9.86§	....	....	8.64	9.01	10.68	....	9.05	8.97	10.90
Baltimore	8.28	8.88	9.61	...	8.76	9.06	11.34 #	15.18	9.19	8.66	10.14
Birmingham	8.18	9.45	11.07	....	8.23	8.60	10.57	....	8.64	8.56	10.70
Boston	9.38	10.44	11.45	53.50	9.42	9.73	12.90 #	15.28	9.63	9.72	11.20
Buffalo	8.40	9.00	10.07	55.98	8.50	8.80	10.90 #	15.00	8.90	8.90	10.45
Chattanooga	8.35	9.69	9.65	...	8.40	8.77	10.46	....	8.88	8.80	10.66
Chicago	8.20	9.45	10.00	53.00	8.23	8.60	8.80	14.65	8.64	8.56	9.88
Cincinnati	8.34	9.48	10.05	52.43	8.54	8.92	9.31	14.96	9.18	8.93	10.21
Cleveland	8.18	9.45	9.95	52.33	8.33	8.69	10.80 #	14.74	9.01	8.79	10.11
Dallas	8.85	10.15	....	....	9.00	8.95	11.01	....	9.00	9.45	10.70
Denver	9.38	11.75	....	....	9.41	9.78	11.10	....	9.82	9.74	11.06
Detroit	8.43	9.70	10.35	56.50	8.58	8.90	9.15	14.91	9.18	8.91	10.13
Erie, Pa.	8.20	9.45	9.95[10]	....	8.50	8.75	9.05[10]	....	9.00	8.85	10.10
Houston	8.45	9.75	8.45	....	8.60	8.55	11.10	....	8.60	9.05	10.30
Jackson, Miss.	8.52	9.79	....	....	8.57	8.94	10.68	....	8.97	8.90	10.74
Los Angeles	7.85	10.75	11.65	57.60	7.90	7.90	12.10	....	7.95	7.90	10.05
Memphis, Tenn.	8.55	9.80	....	....	8.60	8.97	11.96 #	....	9.01	8.93	10.56
Milwaukee	8.33	9.58	10.13	...	8.36	8.73	9.03	14.78	8.85	8.69	10.01
Moline, Ill.	8.55	9.80	10.35	...	8.58	8.95	9.15	....	8.99	8.91	....
New York	8.87	10.13	10.56	53.08	9.31	9.57	12.76 #	15.09	9.35	9.43	10.71
Norfolk, Va.	8.05	...	....	....	8.55	8.60	10.80	....	8.95	8.45	9.95
Philadelphia	8.00	8.90	9.87	51.94	8.69	8.65	11.51 #	15.01	8.50	8.77	9.77**
Pittsburgh	8.18	9.45	10.35	52.00	8.33	8.60	10.80 #	14.65	8.64	8.56	9.88
Portland, Oreg.	8.50	11.20	11.55	57.38	9.55	8.65	14.65 #	15.95	8.65	8.30	11.50
Richmond, Va.	8.45	...	10.40	...	9.15	9.15	...	....	9.40	8.85	10.35
St. Louis	8.54	9.79	10.36	...	8.59	8.97	9.41	15.01	9.10	8.93	10.25
St. Paul	8.79	10.04	10.61	...	8.84	9.21	9.66	....	9.38	9.30	10.49
San Francisco	9.35	10.75	11.00	55.10	9.45	9.70	13.00	16.10	9.50	9.60	12.00
Seattle	9.95	11.15	12.00	57.38	10.00	10.10	14.05	16.35	9.80	9.70	12.10
South'ton, Conn.	9.07	10.33	10.71	....	9.48	9.74	...	....	9.57	9.57	10.91
Spokane	9.95	11.15	12.00	57.38	10.00	10.10	14.05	17.20	9.80	9.70	12.10
Washington	8.88	....	....	....	9.36	9.56	10.94	....	9.79	9.26	10.74

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*Prices do not include gage extras; †prices include gage and coating extras; ‡includes 35-cent bar quality extras; §42 in. and under; **⅛ in. and heavier; ††as annealed; ‡‡over 4 in.; §§over 3 in.; #1 in. round C-1018.

Base quantities, 2000 to 4999 lb except as noted; cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York, Boston, Seattle, Portland, Oreg. 10,000 lb and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb, except in Portland, Oreg., 1000 to 9999 lb; [3]—400 to 9999 lb; [5]—1000 to 1999 lb; [8]—2000 to 3999 lb; [10]—2000 lb and over.

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $105; 19-21% Mn, 1-3% Si, $102.50; 16-19% Mn, $100.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx). Base price per net ton; $245, Johnstown, Duquesne, Sheridan, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala;. Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74% respectively.

(Mn 79-81%). Lump $253 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-90%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.03% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 25.5c per lb of contained Mn, packed, carload 26.8c, ton lot 28.4c, less ton 29.6c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2%). Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lot 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 34c; 2000 lb to min carload, 36c; 500 lb to 1999 lb, 38c; 50 lb cans, add 0.5c per lb. Preminum for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 12.8c per lb of alloy. Packed, c.l. 14c, ton 14.45c, less ton 15.45c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2% from above prices. For 3% C grade Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38.43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l. lump, bulk 28.75c per lb of contained Cr; c.l. packed 30.30c, ton lot 32.05c; less ton 33.45c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk. C 0.025% max, 36.75c per lb contained Cr; 0.010% max, 37.75c. Ton lot, add 3.5c; less ton, add 5.2c. Delivered.

Cr 67.71%, carload, lump, bulk, C 0.02% max, 41.00c per lb contained Cr; 0.025% max, 39.75c; 0.05% max, 39.00c; 0.10% max, 38.50c; 0.20% max, 38.25c; 0.50% max, 38.00c; 1.0% max, 37.75c; 1.5% max, 37.50c; 2.0% max, 37.25c. Ton lot, add 3.4c; less ton lot, add 5.1c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l., 2 in. x D, bulk 30.05c per lb of contained Cr. Packed, c.l. 31.65c, ton 33.45c, less ton 34.95c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed, 8M x D, 21.25c, per lb of alloy, ton lot 22.50c; less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max or Cr 33-36%, Si 45-48%, C 0.05% max. Carload, lump, bulk, 3" x down and 2" x down, 27.50c per lb contained Cr, 14.20c per lb contained Si. 0.75" x down, 28.65c per lb contained Cr, 14.20c per lb contained Si. Delivered.

Chromium Metal Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2% max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.29 per lb, ton lot $1.31, less ton lot $1.33. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 14.20c per lb of contained Si. Packed c.l. 16.70c, ton lot 18.15c, less ton 19.80c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 15.25c per lb contained silicon. Packed, c.l. 17.25c, ton lot 19.05c; less ton 20.4c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 16.4c per lb of contained Si. Packed, c.l. 18.30c, ton lot 19.95c, less ton 21.2c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 19.5c per lb of contained Si. Packed, c.l. 21.15c, ton lot 22.55c, less ton 23.6c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 0.75% max Fe, 0.07% max Ca). C.l. lump, bulk, 22.00c per lb of Si. Packed, c.l. 23.65c, ton lot 24.95c, less ton 25.95c. Add 0.5c for max 0.03% Ca grade. Deduct 0.5c for max 1% Fe grade analyzing min 99.75% Si; 0.75c for max 1.25% Fe grades analyzing min 96.75% Si. Spot, add 0.25c.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy; ton lot, packed, 11.8c.

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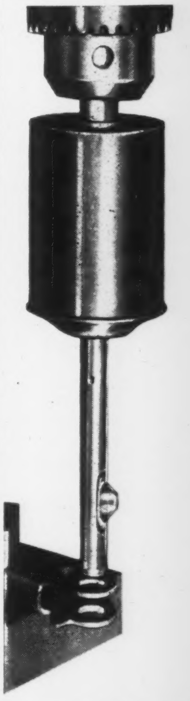

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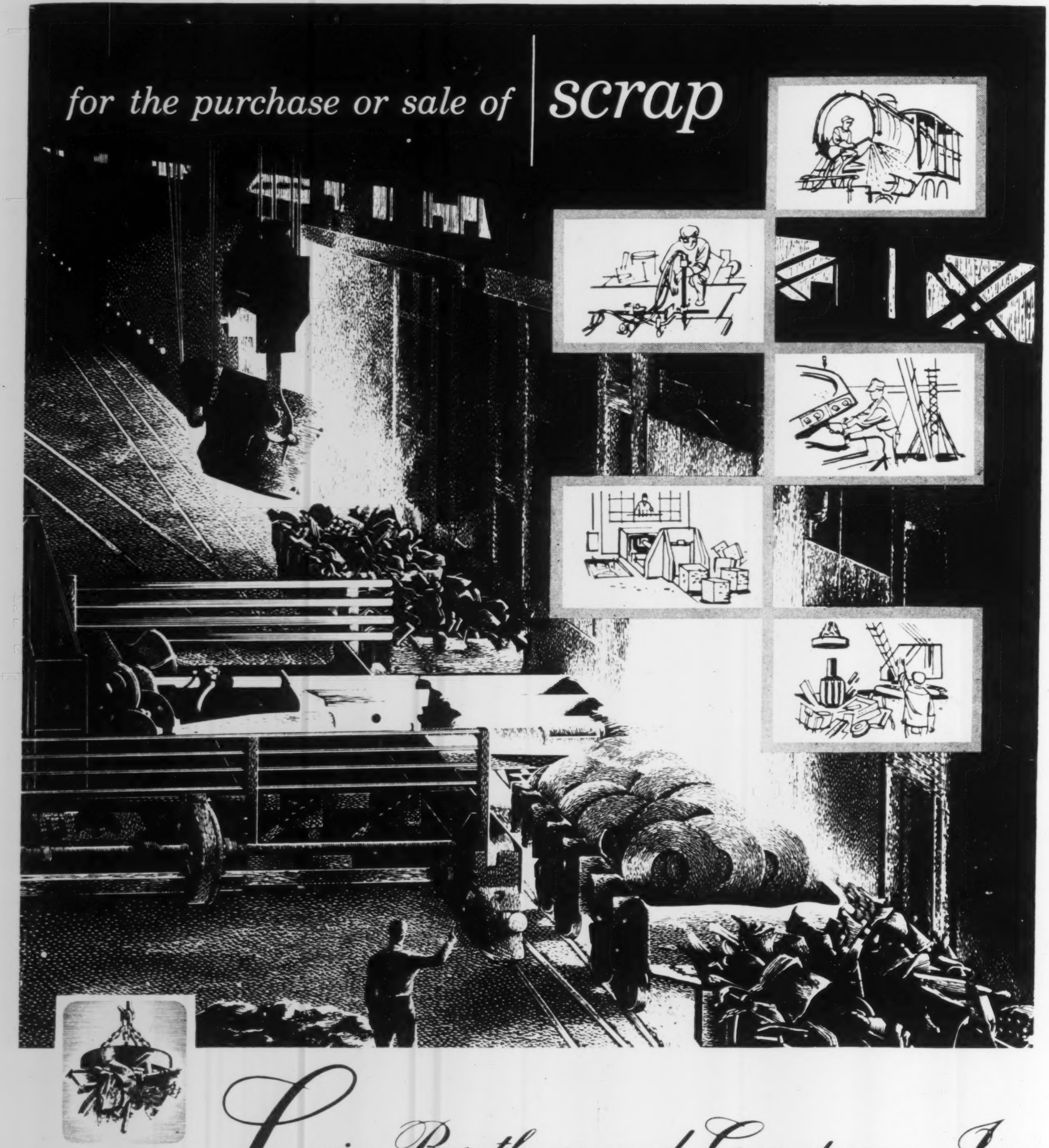
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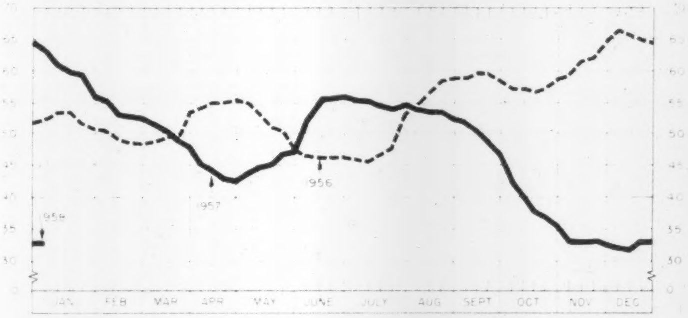
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania—Compiled by STEEL



Dec. 31 1957	Week Ago	Month Ago	Year Ago	Nov. Avg
$33.17	$33.17	$32.33	$63.17	$33.17

Scrap Price Trend Is Uncertain

Absence of active trading over holidays prevents thorough test of market. Bids on December auto lists seen little changed from November's. STEEL's index holds at $33.17

Scrap Prices, Page 502

Pittsburgh—The yearend holiday season resulted in lowest operating rates of the year in this area. Steelmakers are reluctant to hold too much scrap in their yards. They have trimmed buying to the absolute minimum. Prices are nominal.

Chicago—The local scrap market closed out 1957 with prices pretty well pegged at the levels established late in the fourth quarter. Prospects of a steelmaking rate that may dip below the December level provides no cheer to the scrap trade. Mill inventories are substantial, and scrap is in free supply. Nothing but hand-to-mouth buying for current requirements or balancing of grades is foreseen for some time.

Cleveland—Except for the closing of bids on auto lists at the end of December, the scrap market has been devoid of activity the last couple of weeks. Since prices on the auto lists held practically unchanged, dealers are maintaining their quoted prices, which continue nominal in the absence of sales.

One auto list, involving about 10,000 tons of bundles, was bid at prices approximating those made at the end of November. The tonnage was taken by two brokers and is earmarked for immediate shipment to mills. Another auto list, bid in just before the year closed, involved only 3500 tons.

The smaller auto lists last month reflect cutbacks in auto production schedules in recent weeks.

Buffalo—Scrap was at a virtual standstill over the holidays. Dealers think prices will remain in a nominal state until the mills resume buying. Because of slower steel demand and reduced production, the mills may decide not to enter the scrap market at all this month.

Detroit—Automotive lists closed here with prices of No. 1 grades just a few cents lower than those prevailing previously. Turnings and No. 2 grades are off $2 to $3 a ton. The drop was less than had been expected—apparently because only one scrap firm was doing major buying. Some dealer buying is expected shortly. In the absence of orders, prices are holding.

Philadelphia—Steel scrap prices have firmed up on additional sales involving small tonnages of No. 1 heavy melting at $37. Two cargoes for export are being covered at an average of $2 a ton for steel grades over the domestic delivered quotations. The bulk of this tonnage originates within the Philadelphia switching district.

St. Louis—Steady softening of the scrap market continues here. Demand is slow, and only small quantities are involved in orders. Reduced mill operations recently kept inventories well over 60 days. The holidays trimmed industrial scrap offerings, while shop cutbacks reduced railroad offerings.

On Jan. 2, the Wabash Railroad offered 1500 tons of metal for bids. It rejected low bids the two previous months.

The market generally is off $1 to $2 a ton despite a $1 markup in a few cast items resulting from spot demand for hurry-up quantities.

Seattle—The scrap market was lifeless over the holidays. Quoted prices are nominal, with sales lacking. Turnover has been at low ebb the past several weeks, and the yards have been practically idle. Yard receipts are lagging.

Pig Iron . . .

Pig Iron Prices, Page 498

The merchant pig iron market was in the doldrums at the close of 1957, and outlook for the first quarter is not encouraging. Foundries are operating at reduced levels. A few were closed down completely Dec. 20 for two weeks.

Demand for castings has been adversely affected by the hesitant pace of the automotive industry, and the retarded buying by railroad equipment builders. The volume of orders being placed by machine tool and textile mill equipment builders is also small.

Wickwire Spencer Div., Colorado Fuel & Iron Corp., has banked one of its two blast furnaces at Tonawanda, N. Y. There is no indication when the furnace will resume production. One active blast furnace is sufficient to meet hot metal needs of the steelmaking department and still provide tonnage for the merchant market.

Mystic Iron Works, subsidiary of Eastern Gas & Fuel Associates, will not change prices for the first quarter. No. 2 foundry iron will be $68 a gross ton, Everett, Mass., plus current differentials for silicon, phosphorus, and manganese.

(Please turn to Page 505)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Dec. 31, 1957. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Dec. 31	$33.17
Dec. 24	33.17
Nov. Avg.	33.17
Dec. 1956	64.29
Dec. 1952	43.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	29.00-30.00
No. 1 factory bundles	34.00-35.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	28.00-29.00
No. 1 busheling	31.00-32.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	35.00-36.00
3 ft lengths	34.00-35.00
Heavy turnings	30.00-31.00
Punchings & plate scrap	34.00-35.00
Electric furnace bundles	34.00-35.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Stove plate	33.00-34.00
Unstripped motor blocks	26.00-27.00
Clean auto cast	42.00-43.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	36.00-37.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Angles, splice bars	47.00-48.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap

18-8 bundles & solids	210.00-215.00
18-8 turnings	115.00-120.00
430 bundles & solids	95.00-100.00
430 turnings	50.00-55.00

CLEVELAND

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	20.00-21.00
No. 1 factory bundles	29.00-30.00
No. 1 bundles	26.00-27.00
No. 2 bundles	19.00-20.00
No. 1 busheling	26.00-27.00
Machine shop turnings	11.00-12.00
Short shovel turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Cast iron borings	15.00-16.00
Cut foundry steel	33.00-34.00
Cut structurals, plates 2 ft and under	35.00-36.00
Low phos. punchings & plate	29.00-30.00
Alloy free, short shovel turnings	19.00-20.00
Electric furnace bundles	27.00-28.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Charging box cast	33.00-34.00
Heavy breakable cast	29.00-30.00
Stove plate	36.00-37.00
Unstripped motor blocks	23.00-24.00
Brake shoes	30.00-31.00
Clean auto cast	42.00-43.00
Burnt cast	28.00-29.00
Drop broken machinery	40.00-41.00

Railroad Scrap

No. 1 R. R. heavy melt.	31.50-32.50
R.R. malleable	49.00-50.00
Rails, 2 ft and under	55.00-56.00
Rails, 18 in. and under	56.00-57.00
Rails, random lengths	48.00-49.00
Cast steel	43.00-44.00
Railroad specialties	43.00-44.00
Uncut tires	37.00-38.00
Angles, splice bars	43.00-44.00
Rails, rerolling	54.00-55.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	205.00-210.00
18-8 turnings	90.00-95.00
430 clips, bundles, solids	75.00-80.00
430 turnings	40.00-50.00

YOUNGSTOWN

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	29.00-30.00
No. 2 bundles	22.00-23.00
No. 1 busheling	29.00-30.00
Machine shop turnings	13.00-14.00
Short shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Low phos.	33.00-34.00
Electric furnace bundles	33.00-34.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.50-35.50

CHICAGO

No. 1 heavy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	29.00-30.00
No. 2 heavy melting	28.00-29.00
No. 1 factory bundles	34.00-35.00
No. 1 dealer bundles	30.00-31.00
No. 2 bundles	19.00-20.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	29.00-30.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Short shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*41.00-42.00*
Punchings & plate scrap	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	*39.00-40.00*
Stove plate	34.00-35.00
Unstripped motor blocks	*30.00-31.00*
Clean auto cast	*44.00-45.00*
Drop broken machinery	*44.00-45.00*

Railroad Scrap

No. 1 R.R. heavy melt.	35.00-36.00
R.R. malleable	*48.00-49.00*
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*48.00-49.00*
Axles	49.00-50.00
Rails, rerolling	49.00-50.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-200.00
18-8 turnings	90.00-100.00
430 bundles & solids	80.00-90.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	20-21.00
No. 2 heavy melting	18.00-19.00
No. 1 bundles	20.00-21.00
No. 2 bundles	18.00-19.00
No. 1 busheling	20.00-21.00
Machine shop turnings	8.00-9.00
Mixed borings, turnings	9.00-10.00
Short shovel turnings	10.00-11.00
Punchings & plate scrap	26.00-27.00

Cast Iron Grades

No. 1 cupola	30.00
Stove plate	24.00
Charging box cast	24.00
Heavy breakable	24.00
Unstripped motor blocks	15.00
Clean auto cast	33.00
Malleable	33.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	32.00
No. 2 heavy melting	29.00
No. 1 bundles	32.00
No. 2 bundles	22.00†
No. 1 busheling	32.00
Machine shop turnings	*15.00*
Short shovel turnings	*17.00*

Cast Iron Grades

No. 1 cupola	*42.00*
Charging box cast	32.00
Heavy breakable cast	32.00
Unstripped motor blocks	32.00
Clean auto cast	*44.00*
Stove plate	37.00

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00*
Rails, 18 in. and under	*46.00*
Rails, random lengths	*43.00*
Rails, rerolling	*46.50*
Angles, splice bars	*41.00*

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†Nominal

PHILADELPHIA

No. 1 heavy melting	37.00
No. 2 heavy melting	31.50-32.50
No. 1 bundles	37.00
No. 2 bundles	27.00
No. 1 busheling	37.00
Electric furnace bundles	37.00
Mixed borings, turnings	22.50
Short shovel turnings	24.00
Machine shop turnings	22.00
Heavy turnings	31.00
Structurals & plate	40.00-41.00
Couplers, springs, wheels	46.00
Rail crops, 2 ft & under	62.00-64.00

Cast Iron Grades

No. 1 cupola	38.00
Heavy breakable cast	37.00
Malleable	56.00
Drop broken machinery	49.00-50.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	33.50
No. 2 heavy melting	29.00-30.00
No. 1 bundles	33.50
No. 2 bundles	21.00-22.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Short shovel turnings	14.00-15.00
Low phos. (structurals & plate)	45.00-46.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	32.00
Heavy breakable	33.00-34.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	55.00-60.00
410 sheets, clips, solids	60.00-65.00
430 sheets, clips, solids	75.00-80.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	20.00-21.00
No. 1 bundles	23.00-24.00
No. 2 bundles	15.00-16.00
No. 1 busheling	22.00-23.00
Machine shop turnings	9.50-10.00
Mixed borings, turnings	10.50-11.00
Short shovel turnings	11.00-11.50
No. 1 cast	*29.00-30.00*
Mixed cupola cast	28.00-29.00
No. 1 machinery cast	35.00-36.00

BUFFALO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	30.00-31.00
No. 2 bundles	25.00-26.00
No. 1 busheling	30.00-31.00
Mixed borings, turnings	16.00-17.00
Machine shop turnings	15.00-16.00
Short shovel turnings	18.00-19.00
Cast iron borings	16.00-17.00
Low phos.	35.00-36.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	41.00-42.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	49.00-50.00
Railroad specialties	35.00-36.00

CINCINNATI

(Brokers' buying prices; f.o.b shipping point)

No. 1 heavy melting	28.00-29.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	28.00-29.00
No. 2 bundles	19.00-20.00
No. 1 busheling	28.00-29.00
Machine shop turnings	14.00-15.00
Mixed borings, turnings	16.00-17.00
Short shovel turnings	16.00-17.00
Cast iron borings	16.00-17.00
Low phos. 18 in.	36.00-37.00

Cast Iron Grades

No. 1 cupola	35.00-36.00
Heavy breakable cast	32.00-33.00
Charging box cast	32.00-33.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt	33.00-34.00
Rails, 18 in. and under	52.00-53.00
Rails, random lengths	42.00-43.00

BIRMINGHAM

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	24.00-25.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
No. 1 busheling	31.00-32.00
Cast iron borings	12.00-13.00
Short shovel turnings	21.00-22.00
Machine shop turnings	20.00-21.00
Bar crops and plates	38.00-39.00
Structurals & plate	38.00-39.00
Electric furnace bundles	35.00-36.00
Electric furnace:	
3 ft and under	33.00-34.00
2 ft and under	34.00-35.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Stove plate	47.00-48.00
Unstripped motor blocks	38.00-39.00
Charging box cast	22.00-23.00
No. 1 wheels	37.00-38.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-35.00
Rails, 18 in. and under	48.00-49.00
Rails, rerolling	47.00-48.00
Rails, random lengths	41.00-42.00
Angles, splice bars	40.00-41.00

SEATTLE

No. 1 heavy melting	34.00†
No. 2 heavy melting	32.00†
No. 1 bundles	33.00†
No. 2 bundles	25.00†
Machine shop turnings	26.00†
Mixed borings, turnings	26.00†
Electric furnace No. 1	46.00

Cast Iron Grades

No. 1 cupola	35.00†
Heavy breakable cast	32.00†
Unstripped motor blocks	27.00†
Stove plate (f.o.b. plant)	25.00†

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†Nominal

LOS ANGELES

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	33.00
No. 2 bundles	24.00
Machine shop turnings	15.00
Shoveling turnings	19.00
Cast iron borings	19.00
Cut structurals and plate 1 ft and under	48.00

Cast Iron Grades

(F.o.b. shipping point)

No. 1 cupola	42.00

Railroad Scrap

No. 1 R.R. heavy melt	36.00

SAN FRANCISCO

No. 1 heavy melting	36.00
No. 2 heavy melting	34.00
No. 1 bundles	34.00
No. 2 bundles	26.00
Machine shop turnings	20.00
Mixed borings, turnings	20.00
Cast iron borings	20.00
Heavy turnings	20.00
Short shovel turnings	20.00
Cut structurals, 3 ft.	48.00

Cast Iron Grades

No. 1 cupola	45.00
Charging box cast	38.00
Stove plate	36.00
Heavy breakable cast	34.00
Unstripped motor blocks	34.00
Clean auto cast	45.00
No. 1 wheels	36.00
Drop broken machinery	45.00

HAMILTON, ONT.

No. 1 heavy melting	34.00
No. 2 heavy melting	29.00
No. 1 bundles	34.00
No. 2 bundles	24.00
Mixed steel scrap	29.00
Mixed borings, turnings	19.00
Busheling, new factory:	
Prepared	34.00
Unprepared	28.00
Short steel turnings	23.00

Cast Iron Grades†

No. 1 machinery cast	50.00

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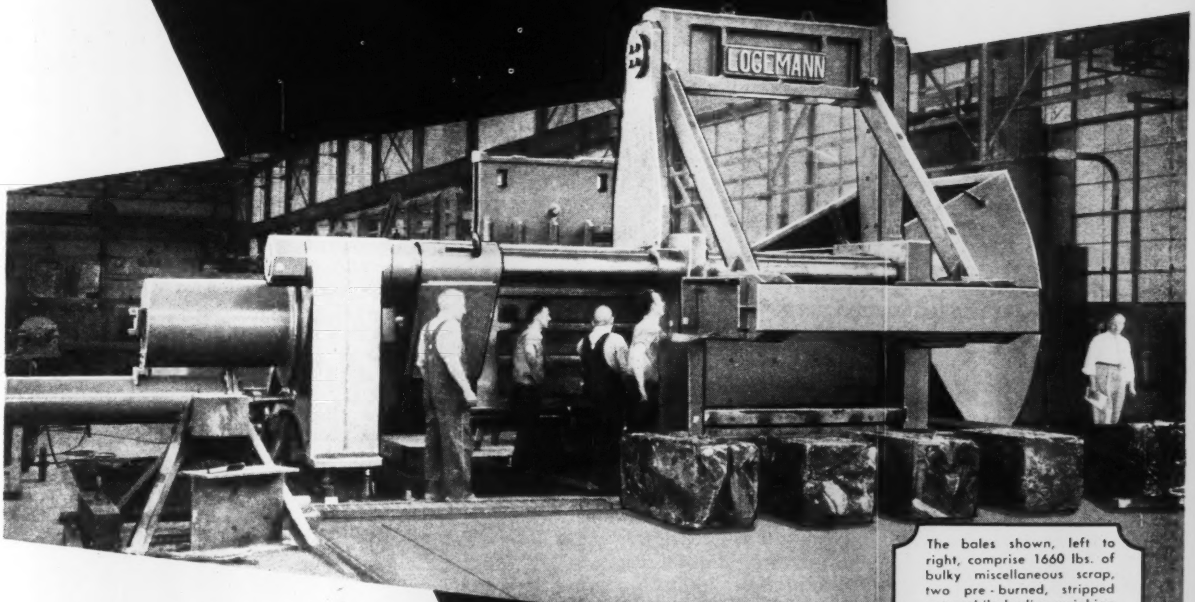
†F.o.b. Hamilton, Ont.

LOGEMANN *presents* the new giant triple-compression 4000-P Series of

SCRAP PRESSES



The bales shown, left to right, comprise 1660 lbs. of bulky miscellaneous scrap, two pre-burned, stripped automobile bodies weighing 1900 lbs., two smaller pre-burned, stripped bodies weighing 1740 lbs., one large unburned body with frame, axles, etc., weighing 2280 lbs., and another unburned lighter body with frame, axles, etc., weighing 2020 lbs.

- **Bale Densities are Extremely High!**
- **Giant Press Box is 20 ft. x 7 ft. x 5 ft.**
- **Two 150 HP Pumps Generate Hydraulic Pressure**

In this Logemann Scrap Press compressed bales measure 24 inches by 24 inches by a variable third dimension which is determined by the character and quantity of scrap charged. The first or gathering ram compresses the load of scrap from 20 ft. to 2 ft. . . . the intermediate side ram reduces the cross-dimension from 7 ft to 2 ft. . . . finally the third or finishing ram moves upward, to compress the vertical dimension into an extremely dense bale, ready for remelting. The cover is then withdrawn and the finishing ram elevates the compressed bale level with the top of the box, to allow the cover to push it off for loading into cars.

Two large 150 HP pumps generate hydraulic pressure for operating the press-rams at high pressures. Three smaller pumps are used to operate the press cover and the loading hopper. This hopper can be filled with miscellaneous scrap while the press is making a bale, and then dumped quickly into the box as soon as the preceding bale has been discharged.

The large pumps give rapid movement to all rams, and to handle their fluid delivery the operating-valves are proportionately over-size. These valves are operated by compressed air and easily controlled from a remote stand, through a bank of electrical switches and push-buttons, in front of the operator.

This same press can be used for baling bodies and extremely bulky scrap, also for making standard size, high-density bales of new sheet clips.

We are prepared to build many smaller sizes or larger, if required, to meet your specific requirements. You are invited to present your problem for discussion.

Write for details about the newly developed 3500-P series with tamping cover and side bale ejection and the new giant double compression press with box 20 ft. long, 7½ ft. wide, and 5 ft. deep.

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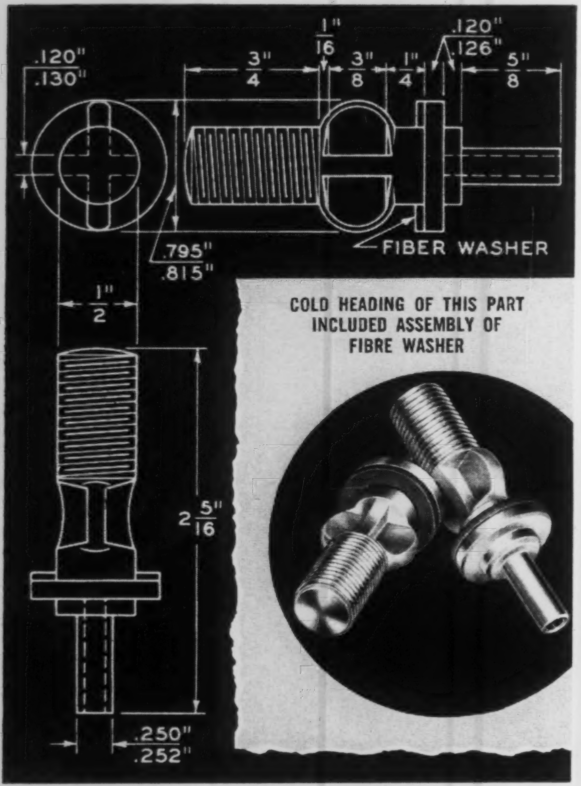

smartly designed part saved by cold heading

Functionally the design of the above part was ideal. But its six different diameters and the need to pre-assemble a fibre washer posed production difficulties. Making it by conventional machining methods would price it out of reach. It looked too complex for cold heading.

But Progressive did it. We can apply cold heading to components normally considered as machining jobs, which would naturally cost more. You, too, can save money on difficult parts. For more case histories, write for our "*Bank Book of Savings in Cold Heading.*"

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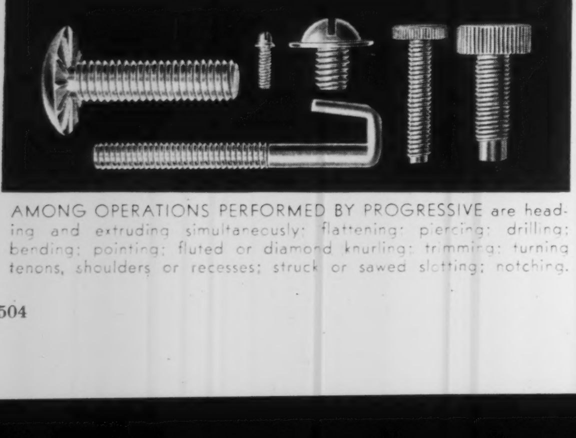
SAVE ON PARTS LIKE THESE



AMONG OPERATIONS PERFORMED BY PROGRESSIVE are heading and extruding simultaneously; flattening; piercing; drilling; bending; pointing; fluted or diamond knurling; trimming; turning tenons, shoulders or recesses; struck or sawed slotting; notching.

★ . . . for any information about bearings and bearing metals, consult with the A. W. Cadman Mfg. Co., master makers of fine bearing metals since 1860.

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✓ Tell the buyers and specifiers in these plants of the machines or materials you have for sale through an "Equipment—Materials" advertisement.

✓ For rates write STEEL, Penton Building, Cleveland 13, Ohio.

(*Concluded from Page* 501)

The price is based on October-November costs.

Plates . . .

Plate Prices, Page 491

Mill allocations of plates have been forgotten. Many consumers have not taken full allotments because of declines in construction activity and railroad requirements.

Fabricators of plates and structural shapes are cutting their purchases at Pittsburgh. They are watching their inventories closely. Offerings of extra tonnages by the mills are more common, but few are being taken up by consumers.

Marginal prices on plates have disappeared completely, and it is rumored that the material has been offered below published prices.

January schedules for heavy sheared capacity are filled at Eastern plate mills in most cases, but there are openings for the lighter gages. Consumers' inventories of lighter gages are comfortable, considering that fabricating shop backlogs are lower, including tank volume. Weldment shops are less active. So are machine tool builders and heavy equipment shops Railroad car builders are gradually cutting into their backlogs, with plate supplies ample. There have been some deferments of shipyard tonnage, but first half ship volume will be heavier.

Structural Shapes . . .

Structural Shape Prices, Page 491

One bright spot in the 1958 outlook for structurals and other building steel products is the prospect that toll road and highway construction will take larger tonnages than they did in 1957. Reinforcing and structural steel will be the chief beneficiaries.

Illinois has announced a 1958 road building program that is approximately $50 million higher than 1957's. Cook County will spend about $80 million on roads.

In 1957, shortages of engineers and some commodities (cement, for example) and the slow delivery of steel held back expressway construction.

Chicago has just announced it will spend $1.5 million to repave and improve major streets around the north approach of the Calumet Skyway. It will open the $101-million toll route next spring.

Wisconsin also has announced a record highway program which is $22 million greater than 1957's.

The federal interstate highway program is slow in most eastern states.

Contracts for fabricated structural steel (100 tons or more) totaled 110,000 tons in New England last year, vs. 162,000 tons in 1956. The decline in tonnage was largely in bridges. During 1956, Connecticut turnpike contracts accounted for 50,000 tons.

Lower capital expenditures in the East will reduce structural demands for industrial expansion. School requirements, though, are expected to hold at a high level.

Shipments of heavy structural shapes totaled an estimated 6,935,000 tons in 1957, or about 8.4 per cent of the total finished steel movement.

Structural fabricating shops shipped an estimated 3,730,000 tons in the year, and booked around 2,800,000 tons. In 1956 their shipments were 3,205,485 tons, and bookings 4,013,185 tons.

Bookings in 1956 were 807,000 tons in excess of shipments, while in 1957, shipments exceeded bookings by 930,330 tons.

Since April, the fabricating industry has shipped more tonnage than it booked each month, reducing its backlog by about 18 per cent.

Structural mill capacity increased more than 1 million tons annually the past year.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1200 tons, grade separation, Northwest Expressway, Foster-Central Avenues, Chicago, to the Allied Structural Steel Co., Chicago.

1015 tons, grade separation, Northwest Expressway, intersection with Ainsle Avenue at Lawrence Avenue, Chicago, to the American Bridge Div., U. S. Steel Corp., Pittsburgh.

750 tons, state highway bridges, Middleboro, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; Henley-Lundgren Co., Shrewsbury, Mass., and Central Construction Co., Lawrence, Mass., joint general contractors.

545 tons, three state highway I-beam bridges, interstate route 505, Jefferson County, New York, to the Ernst Iron Works Inc., Buffalo; the Lane Construction Corp., Meriden, Conn., is general contractor.

250 tons, state highway bridges, Southeast Expressway, Weymouth, Mass., to the West End Iron Works, Cambridge, Mass.; C. J. Maney Co. Inc., Lexington, Mass., is general contractor.

100 tons, state highway bridge, Old Winthrop Road, Augusta, Maine, to the Bancroft & Martin Rolling Mills Co., South Portland, Maine; Reed & Reed, Woolwich, Maine, is general contractor.

STRUCTURAL STEEL PENDING

320 tons, Washington State girder bridge, Snohomish County; bids to Olympia, Wash., Jan. 7, postponed from Dec. 31.

195 tons, state highway bridge, Edgecomb-Newcastle, Maine; bids Jan. 8, Augusta, Maine.

150 tons, Washington State underpass, Clark County; bids to Olympia, Wash., Jan. 7, postponed from Dec. 31.

100 tons, state highway bridge, Grafton, Mass., bids in.

REINFORCING BARS . . .

REINFORCING BARS PLACED

4280 tons, state highway structures, Bruckner

(*Please turn to Page* 510)

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Plateau Year Expected

Metalmen are not excited about the first half but look for a pickup in the second. Consensus: 1958 will end up at least as good as 1957, perhaps a little better

Nonferrous Metal Prices, Pages 508 & 509

PRODUCERS of nonferrous metals expect to have another plateau year in 1958. A few modest gains are foreseen, but it's thought that most metals will hold close to 1957 levels. Barring any drastic change in the business outlook, here's how the outlook shapes up:

Aluminum—Primary production is seen at the 1957 level of around 1,650,000 tons. New production will be just about offset by slowdowns at several facilities. Domestic availability may be slightly higher than last year's 2.3 million tons because of increased imports and secondary production.

Some industry people see domestic consumption at 2.1 million tons, compared with an estimated 1.9 million tons in 1957. Their reasoning: 1. Housing starts should be up. 2. Defense spending for aircraft and missiles is expected to rise. 3. The inventory reduction cycle has about ended.

Look for a price bump in August when aluminum workers receive a package wage increase of around 14 cents an hour.

Zinc—Consumption could be a little above last year's 925,000 tons if housing starts and the highway program pick up as expected and if auto production stays close to its 1957 pace. Smelter output won't be much under this year's 1,050,000 tons even though there have been some sharp cuts in mine output. Reason: Most smelters have large stocks of concentrates on hand that will be used in 1958.

Most metalmen believe the price will begin strengthening in the second quarter and should stand at 11 cents a pound by yearend.

Lead—Domestic supply should be within 5 per cent of last year's 1,285,000 tons. Major consuming industries will buy at about 1957 levels, with total consumption running just slightly under last year's. Look for the price to stay between 13 and 14 cents a pound most of the year.

Titanium—Production for next year is pegged at 4500 to 5000 tons, compared with 5600 tons in 1957. A pickup from last year's second half slump is expected because of increased military spending, some civilian plane orders, and greater demand from the chemical processing industry. Watch for the price of mill products to come down 7 to 8 per cent.

Magnesium—Consumption could drop a little from last year's 47,000 tons unless defense expenditures pick up substantially. Production will be pretty closely geared to the consumption level.

Copper—Look for a better supply-demand balance in 1958. Reasons: 1. Mine curtailments will begin to be felt later in the year. 2. More new housing starts and home renovations could push consumption above the 1957 level.

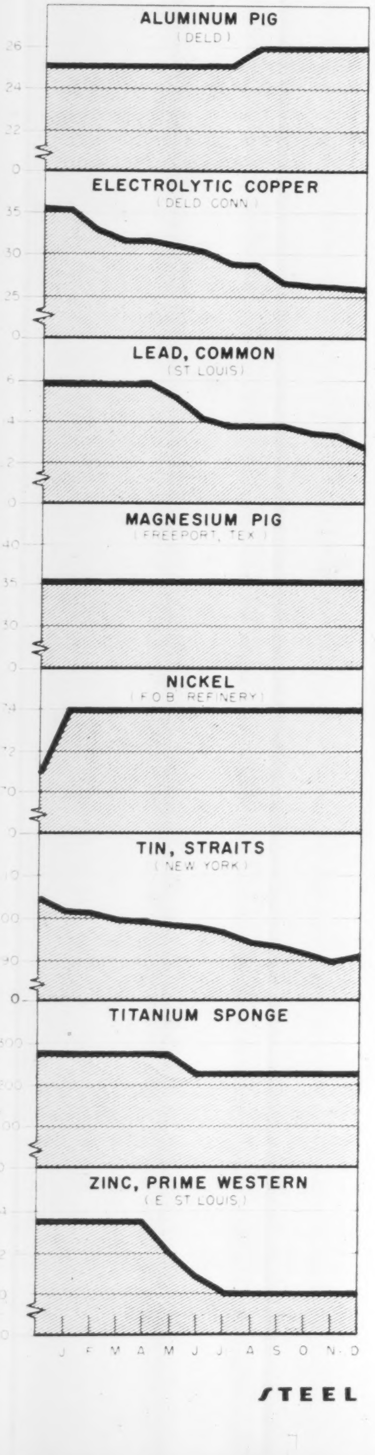
Many industry people expect the price of primary to begin rising in the second half and reach 30 cents a pound by yearend.

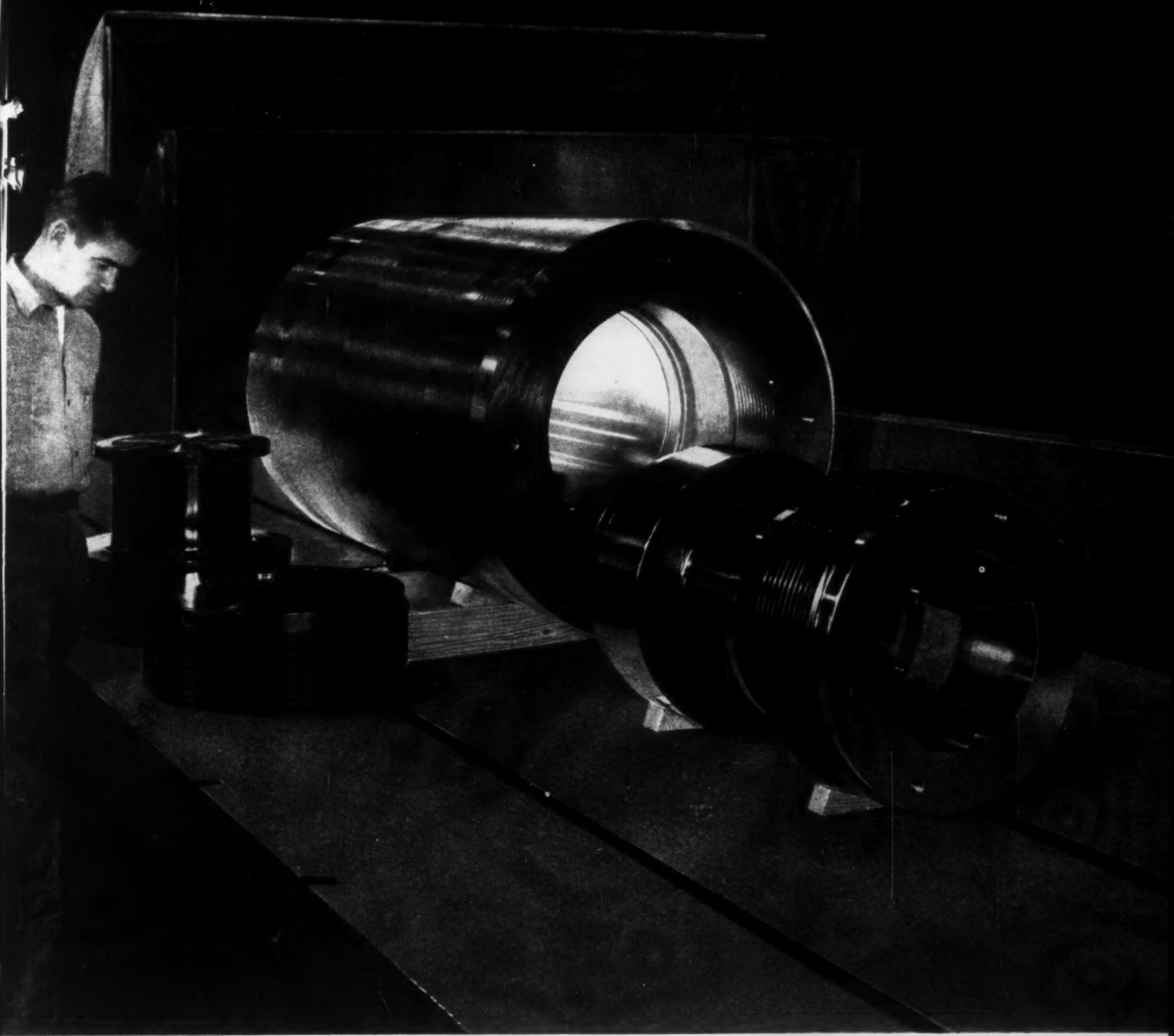
Market Memos

- Reynolds Metals Co. has established a division to plan the marketing of aluminum containers, such as oil cans. The unit will also set up a research program to determine their potential.
- The construction industry and makers of building products can bring about a reduction in the cost of aluminum windows through standardization of sizes, claims Eugene Gurkoff, president, Capitol Products Corp., Mechanicsburg, Pa. American homes have at least 3000 window sizes, but 50 per cent of all building requirements can be met with eight basic sizes, contends Mr. Gurkoff.
- The Canadian-British Aluminium Co. Ltd. plant at Baie Comeau, Que., is now in operation. Its initial capacity is 45,000 net tons of aluminum ingots annually. Plans are to double output by early 1959.

How Prices Went in '57

(Cents per pound)





WHO FORGES THE TOUGH ONES? *& machines them, too*

Assume that you've just designed a high pressure cylinder to be used in the production of high energy explosives. It is a good sized forging—the main cylinder is 50¼″ long, 31½″ O.D., and 18″ I.D.—with high physicals. It must be forged of a highly alloyed chromium nickel molybdenum vanadium steel to obtain a tensile of 164,000 psi . . . a yield point of 153,000 lbs. . . . and hydrostatic test at 30,000 psi.

Naturally, you prefer one responsible source to do the whole job—one organization to melt the steel, forge, and finish all parts to exact prescribed tolerances.

So, call on National Forge, a company that's been producing big forgings for over 40 years—from melting steel through finish machining and protective coating (dulite, in this case) all in one completely integrated plant. Let us quote on your next job for big machined forgings—and demonstrate the answer to "who forges and machines the tough ones . . . best?"

NATIONAL FORGE & ORDNANCE COMPANY
IRVINE, WARREN COUNTY, PA.

For more information on "the tough ones," and the machinery that makes them "best"— write for Bulletin NFO.

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 29.90; No. 43, 29.70; No. 195, 31.30; No. 241, 31.50; No. 356, 29.90, 30-lb ingots.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.50-26.50, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $74.75 per lb of contained Be, with balance as Al at market price, fo.o.b. shipping point.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per ton, ton lots.

Cadmium: Sticks and bars, $1.55 per lb deld.

Cobalt: 97-99%, $2.00 per lb for 550-lb keg; $2.02 per lb for 100 lb case; $2.07 per lb under 100 lb.

Columbium: Powder, $120 per lb, nom.

Copper: Electrolytic, 27.00 deld.; custom smelters, 25.00; lake, 27.00 deld.; fire refined, 26.75 deld.

Germanium: First reduction, $179.17-197.31 per lb; intrinsic grade, $197.31-220 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $80-110 nom. per troy oz.

Lead: Common, 12.80; chemical, 12.90; corroding, 12.90, St. Louis. New York basis, add 0.20.

Lithium: 98 + %, 50-100 lb, cups or ingots, $12; rod, $15; shot or wire, $16. 100-500 lb, cups or ingots, $10.50; rod, $14; shot or wire, $15, f.o.b. Minneapolis.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex.; 12 in. sticks, 59.00 f.o.b. Madison, Ill.

Magnesium Alloys: AZ91A (diecasting), 40.75 deld.; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $223-230 per 76-lb flask.

Molybdenum: Unalloyed, turned extrusions, 3.75-5.75 in. round, $9.60 per lb in lots of 2500 lb or more, f.o.b. Detroit.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, 74.50; "F" nickel 5 lb ingots in kegs for addition to cast iron, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter, 71.25 per lb of nickel content before 1 cent freight allowance, f.o.b. Copper Cliff, Ont.

Osmium: $80-100 per troy oz nom.

Palladium: $21-24 per troy oz.

Platinum: $77-80 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $118-125 per troy oz.

Ruthenium: $45-55 per troy oz.

Selenium: $7.50 per lb, commercial grade.

Silver: Open market, 90.00 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Rod, $60 per lb; sheet, $55 per lb.

Tellurium: $1.65-1.85 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 92.625.

Titanium: Sponge, 99.3 + %, grade A-1 ductile (0.3% Fe max.), $2.25; grade A-2 (0.5% Fe max.), $2.00 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $3.50 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99 + % hydrogen reduced, $4.10-4.20.

Zinc: Prime Western, 10.00; brass special, 10.25; intermediate, 10.50, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 11.35; special high grade, 11.75 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 15.25; No. 5, 14.75 deld.

Zirconium: Sponge, commercial grade, $5.10 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00-25.50; No. 12 foundry alloy (No. 2 grade), 22.00-23.25; 5% silicon alloy, 0.60 Cu max., 25.75-26.25; 13 alloy, 0.60 Cu max., 25.75-26.25; 195 alloy, 25.00-27.00; 108 alloy, 22.50-23.25. Steel deoxidizing grades, notch bars, granulated or shot; Grade 1, 24.00; grade 2, 22.25; grade 3, 21.00; grade 4, 19.00.

Brass Ingot: Red brass, No. 115, 27.25; tin bronze, No. 225, 36.00; No. 245, 30.75; high-leaded tin bronze, No. 305, 31.25; No. 1 yellow, No. 405, 22.75; manganese bronze, No. 421, 24.50.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.50; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.82, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.80, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 32.355; l.c.l., 32.98. Weatherproof, 30,000-lb lots, 33.66; l.c.l., 34.78. Magnet wire deld., 40.43, before quantity discounts.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $18.50 per cwt; pipe, full coils, $18.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets and strip, $9.50-15.95; sheared mill plate, $8.00-11.50; wire, $7.50-11.50; forging billets, $6.00-7.60; hot-rolled and forged bars, $6.15-7.90.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 24.00; ribbon zinc in coils, 20.50; plates 19.00

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.00-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	126	106	128
Strips, C.R.	124	108	138
Plate, H.R.	120	105	121
Rod, Shapes, H.R...	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

Sheets: 1100 and 3003 mill finish (30,000 lb base; freight allowed).

Thickness Range Inches	Flat Sheet	Coiled Sheet
0.249-0.136	43.10-47.60	....
0.135-0.096	43.60-48.70	40.50-41.10
0.095-0.077	44.30-50.50	40.60-41.30
0.076-0.061	44.90-52.80	40.80-42.00
0.060-0.048	45.60-55.10	41.40-43.10
0.047-0.038	46.20-57.90	41.90-44.50
0.037-0.030	46.60-62.90	42.30-46.30
0.029-0.024	47.20-54.70	42.60-47.00
0.023-0.019	48.20-58.10	43.70-45.40
0.018-0.017	49.00-55.40	44.30-46.00
0.016-0.015	49.90-56.30	45.10-46.80
0.014	50.90	46.10-47.80
0.013-0.012	52.10	46.80
0.011	53.10	48.00
0.010-0.0095	54.60	49.40
0.009-0.0085	55.90	50.90
0.008-0.0075	57.50	52.10
0.007	59.00	53.60
0.006	60.60	55.00

ALUMINUM (continued)

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam., 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	42.70	47.50
5050-F	43.80	48.60
3004-F	44.80	50.50
5052-F	44.40	51.20
6061-T6	46.90	53.00
2024-T4	50.60	57.40
7075-T6*	58.40	66.00

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	78.20	75.20	....	...
0.156-0.172	66.20	63.40	....	....
0.188	66.20	63.40	....	81.60
0.219-0.234	63.00	61.50	....	....
0.250-0.281	63.00	61.50	....	77.90
0.313	63.00	61.50	....	74.20
0.344	62.50	....	....	...
Cold-Finished				
0.375-0.547	62.50	61.30	74.80	69.80
0.563-0.688	62.50	61.30	71.10	65.50
0.719-1.000	61.00	59.70	64.90	61.70
1.063	61.00	59.70	....	59.60
1.125-1.500	58.60	57.40	62.80	59.60
Rolled				
1.563	57.00	55.70	....	...
1.625-2.000	56.30	54.90	....	57.50
2.125-2.500	54.80	53.40	....	...
2.563-3.375	53.20	51.70	....	...

Forging Stock: Round, Class 1, 45.20-58.60 in specific lengths, 36-144 in., diam. 0.375-8 in. Rectangles and squares, Class 1, 50.50-66.60 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA schedule 40, alloy 6063-T6, standard lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$19.40	2	$ 59.90
1	30.50	4	165.05
1¼	41.30	6	296.10
1½	49.40	8	445.55

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
9-11	45.40-47.00	60.60-64.80
12-14	45.70-47.20	61.30-65.80
15-17	45.90-47.90	62.50-67.50
18-20	46.50-48.30	64.50-70.10

MAGNESIUM

Sheet and Plate: AZ31B standard grade, 0.32 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.0 in., 67.90. AZ31B spec. grade, .032 in., 171.30; .081 in., 108.70; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, .25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	69.60-72.40	84.60-87.40
12-14	70.70-73.00	85.70-88.00
24-26	75.60-76.30	90.60-91.30
36-38	89.20-90.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

(Cents per pound, New York, in ton lots.)

Aluminum: 1100 clippings, 13.50-14.00; old sheets, 10.50-11.00; borings and turnings, 6.50-

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	50.13b	47.36c	....	50.32	23.000	23.000	22.250
Yellow Brass	44.02	32.30d	44.56	46.93	17.375	17.125	15.750
Low Brass, 80%	46.50	46.44	47.04	49.31	19.500	19.250	18.750
Red Brass, 85%	47.37	47.31	47.91	50.18	20.250	20.000	19.500
Com. Bronze, 90%	48.78	48.72	49.32	51.34	21.000	20.750	20.000
Manganese Bronze	52.01	46.01	56.61	....	16.125	15.875	15.375
Muntz Metal	46.39	42.20	....	....	16.375	16.125	15.625
Naval Brass	48.27	42.58	55.33	51.68	16.125	15.875	15.375
Silicon Bronze	54.76	53.95	54.80	56.74e	22.625	22.375	21.625
Nickel Silver, 10%	60.43	62.75	62.75	....	23.625	23.375	11.813
Phos. Bronze, A-5% ...	69.07	69.57	69.57	70.75	23.750	23.500	22.500

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold--drawn. d. Free cutting. e. 3% silicon. f. prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, or any or all kinds of scrap, add 1 cent per lb.

7.00; crankcases, 10.50-11.00; industrial castings, 10.50-11.00.

Copper and Brass: No. 1 heavy copper and wire, 18.25-18.75; No. 2 heavy copper and wire, 16.25-16.75; light copper, 14.75-15.25; No. 1 composition red brass, 15.50-16.00; No. 1 composition turnings, 15.00-15.50; new brass clippings, 13.00-13.50; light brass, 9.00-9.50; heavy yellow brass, 11.00-11.50; new brass rod ends, 12.00-12.50; auto radiators, unsweated, 11.75-12.00; cocks and faucets, 12.00-12.50; brass pipe, 12.50-13.00.

Lead: Heavy, 8.50-9.00; battery plates, 3.50-3.75; linotype and stereotype, 10.25-10.75; electrotype, 9.25-9.75; mixed babbitt, 10.50-11.00.

Monel: Clippings, 30.00-32.00; old sheets, 29.00-30.00; turnings, 23.00-24.00; rods 30.00-32.00.

Nickel: Sheets and clips, 42.00-47.00; rolled anodes, 42.00-47.00; turnings, 40.00-42.00; rod ends, 42.00-47.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 2.75-3.00; old diecast scrap, 1.50-1.75.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 16.50-17.50; 3003 clippings, 16.50-17.50; 6151 clippings, 16.00-17.50; 5052 clippings, 16.00-17.00; 2014 clippings, 15.50-17.00; 2017 clippings, 15.50-17.00; 2024 clippings, 15.50-17.00; mixed clippings, 15.00-16.00; old sheets, 13.50; old cast, 13.50; clean old cable (free of steel), 16.00-16.50; borings and turnings, 13.50-15.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 53.00; light scrap, 48.00; turnings and borings, 33.00.

Copper and Brass: No. 1 heavy copper and wire, 21.00; No. 2 heavy copper and wire, 19.00; light copper, 16.75; refinery brass (60% copper) per dry copper content, 18.75.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 21.00; No. 2 heavy copper and wire, 19.00; light copper, 16.75; No. 1 composition borings, 18.50; No. 1 composition solids, 19.00; heavy yellow brass solids, 13.25; yellow brass turnings, 12.25; radiators, 15.00.

PLATING MATERIALS

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 43.79; oval, 42.00, 5000-10,000 lb; electrodeposited, 35.75, 2000-5000 lb lots; cast, 36.25, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, 114.25; 10-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 111.50; 200-499 lb, 110.00; 500-999 lb, 109.50; 1000 lb or more, 109.00.

Zinc: Balls, 17.50; flat tops, 17.50; flats, 19.25; ovals, 18.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.70 per lb in 100-lb drums.
Chromic Acid: 100 lb, 33.30; 500 lb, 32.80; 2000 lb, 32.15; 5000 lb, 31.80; 10,000 lb, 31.30; f.o.b. Detroit.

Copper Cyanide: 100-200 lb, 71.60; 300-900 lb, 69.60.

Copper Sulphate: 100-1900 lb, 14.55; 2000-5900 lb, 12.55; 6000-11,900 lb, 12.30; 12,000-22,900 lb, 12.05; 23,000 lb or more, 11.55.

Nickel Chloride: Less than 400 lb, 35.00; 400-9999 lb, 33.00; 10,000 lb, 32.50.

Nickel Sulphate: 5000-22,000 lb, 33.50; 23,000-35,900 lb, 33.00; 36,000 lb or more, 32.50.

Sodium Cyanide: 100 lb, 27.60; 200 lb, 25.90; 400 lb, 22.90; 1000 lb, 21.90; f.o.b. Detroit.

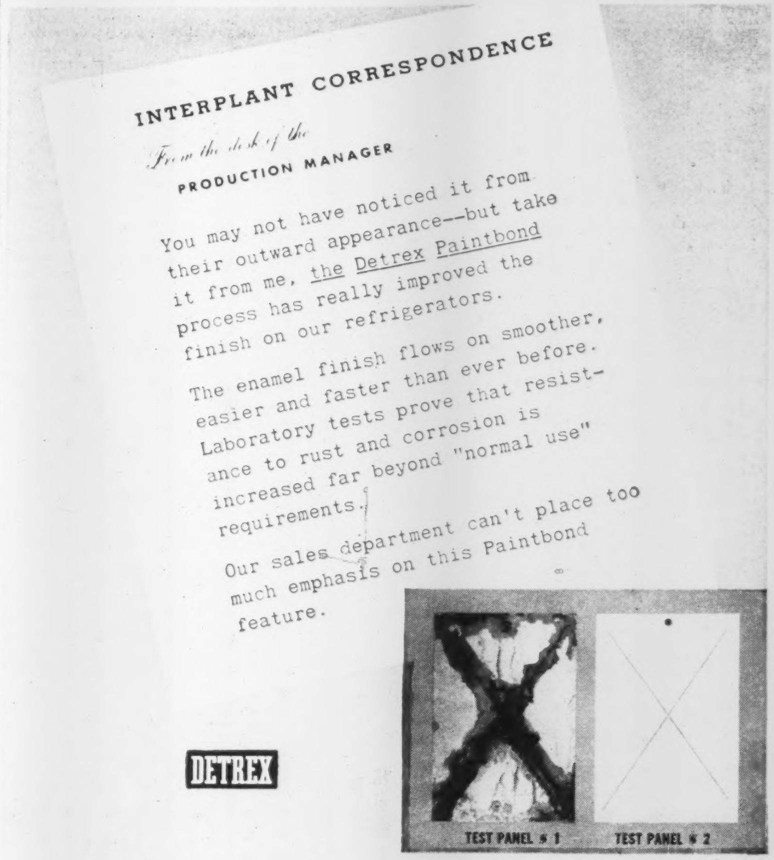
Sodium Stannate: Less than 100 lb, 74.70; 100-600 lb, 65.80; 700-1900 lb, 63.00; 200-9900 lb, 61.20; 10,000 lb or more, 59.80.

Stannous Chloride (anhydrous): Less than 25 lb, 164.10; 25 lb, 129.10; 100 lb, 114.10; 400 lb, 111.60; 5200-19,600 lb, 99.40; 20,000 lb or more, 87.20.

Stannous Sulphate: Less than 50 lb, 126.90; 50 lb, 96.90; 100-1900 lb, 94.90; 2000 lb or more, 92.90.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

MEMO TO MANAGEMENT



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From the desk of the
PRODUCTION MANAGER

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The enamel finish flows on smoother, easier and faster than ever before. Laboratory tests prove that resistance to rust and corrosion is increased far beyond "normal use" requirements.

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Scribed panels illustrated above demonstrate effectiveness of exclusive DETREX Paintbond process in accelerated corrosion tests. Panel with ordinary finish shows excessive "creepage" or flaking at scratch lines after only 48 hours of salt spraying. Other panel, thoroughly protected with DETREX Paintbond, remains unaffected after *250-hour salt spray test!*

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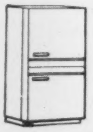

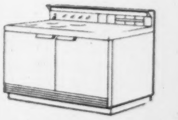

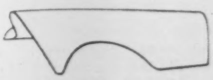

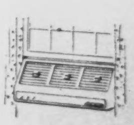

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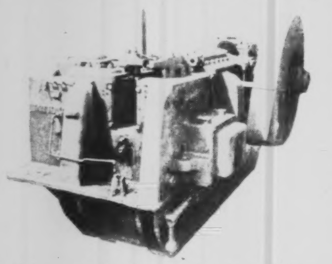

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By checking the classified pages of STEEL each week you'll be able to find many different types of equipment which will fit your requirements. Used or surplus equipment—you can best find it in STEEL's classified columns.

(Concluded from Page 505)

Expressway, the Bronx, N. Y., to Fabricators Steel & Mfg. Corp., New York; Slattery Construction Co., New York, general contractor; 11,000 tons, fabricated structural steel, to Harris Structural Steel Co., New York, previously reported.

515 tons, including 57 tons of structural steel, dormitory and student union building, University of Arkansas, Little Rock, Ark., to the Fischer Steel Co., Little Rock; Harmon Construction Co., Oklahoma City, Okla., general contractor.

380 tons, library addition, University of Massachusetts, Amherst, Mass., to the U. S. Steel Supply Div., U. S. Steel Corp., Boston; Granger Construction Co., Worcester, Mass., general contractor; structural steel to Holyoke Iron Works, Holyoke, Mass.

105 tons, Mesa Canal, Bureau of Reclamation project, eastern Washington, to Bethlehem Pacific Coast Steel Corp., Seattle; Donald M. Drake Co., Portland, Oreg., general contractor.

100 tons or more, bridges and highway structures, Jefferson County, New York, to the Buffalo Steel Co., Buffalo; the Lane Construction Corp., Meriden, Conn., is general contractor.

REINFORCING BARS PENDING

345 tons, Washington State girder bridge, Snohomish County; bids to Olympia, Wash., Jan. 7, postponed from Dec. 31; also 220 ft of concrete piling in same project.

140 tons, two schedules, 10.5-mile Esquatzel diversion canal, Washington State; Donald M. Drake Co., Portland, Oreg., low at $2,133 230 and $547,774, respectively.

100 tons, also 3500 ft of concrete piling, Washington State, three girder bridges, Thurston County; bids to Olympia, Wash., Jan. 7.

100 tons or more, junior high school, Kent, Wash.; George E. Teufel, Seattle, is low at $614,839.

PLATES . . .

PLATES PLACED

100 tons or more, 1-in. plate, reactor shell building and steel tank, to the Graves Tank & Mfg. Co., Arcadia, Calif., by the Atomic Energy Commission, Idaho Falls, Idaho.

PLATES PENDING

100 tons or more, reactor building shell, involving 1-in. carbon steel plates; also 300,000-gal steel tank; Graves Tank & Mfg. Co., Arcadia, Calif., low at $663.537 to the Atomic Energy Commission, Idaho Falls, Idaho.

100 tons or more, 26-in. water pipe, 1843 lineal ft, alternative for reinforced concrete pipe, Portland, Oreg.; System Construction Co., Portland, low at $35,715 for steel, $35,369 for concrete.

100 tons or more, 860,000 gal welded steel standpipe, Burlingame District, Portland, Oreg.; bids Dec. 26.

PIPE . . .

CAST IRON PIPE PLACED

130 tons, system improvement, Anchorage, Alaska, to U. S. Pipe & Foundry Co., Seattle.

RAILS, CARS . . .

RAILROAD CARS PLACED

Rock Island, 10 seventy-ton covered hoppers, to the American Car & Foundry Div., ACF Industries, New York.

Northern Refrigerator Line, 100 forty-ton refrigerator cars to the Pacific Car & Foundry Co., Renton, Wash.

Merchants Despatch Transportation Corp., 50 forty-ton refrigerator cars, to the Pacific Car & Foundry Co., Renton, Wash.

Erie, seven depressed center flats, including six 110-ton capacity, and one 200-ton capacity, to its own shops.

Southern Pacific, rebuilding 49 seventy-ton gondolas with removable roofs and movable bulkheads for carrying coiled tin plate and finished steel products, to its own shops, Bayshore, Calif.

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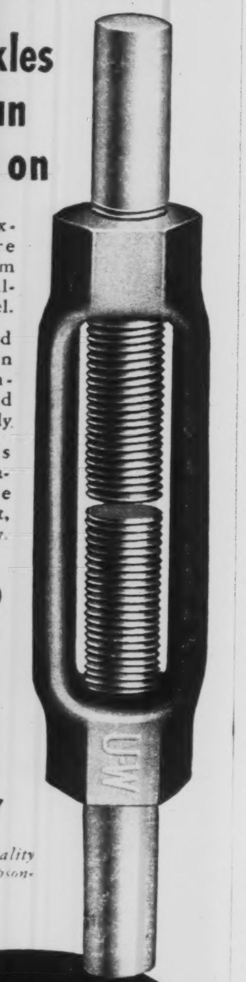

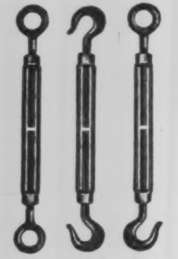

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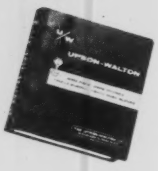

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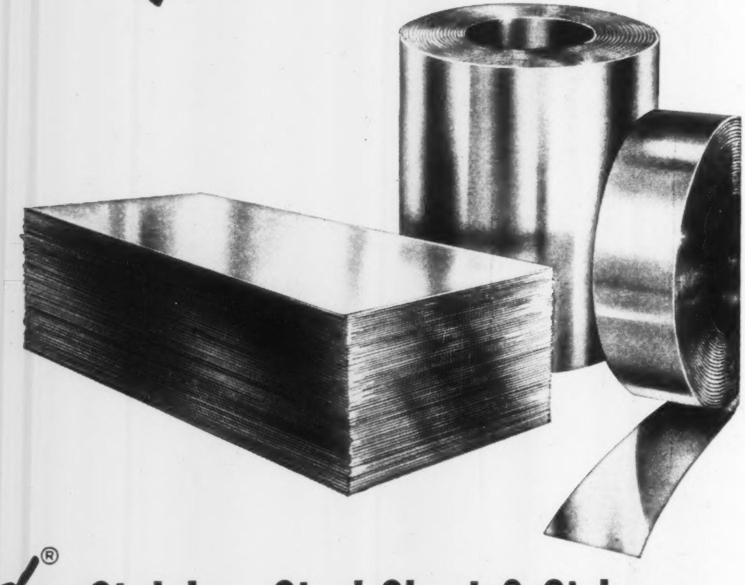

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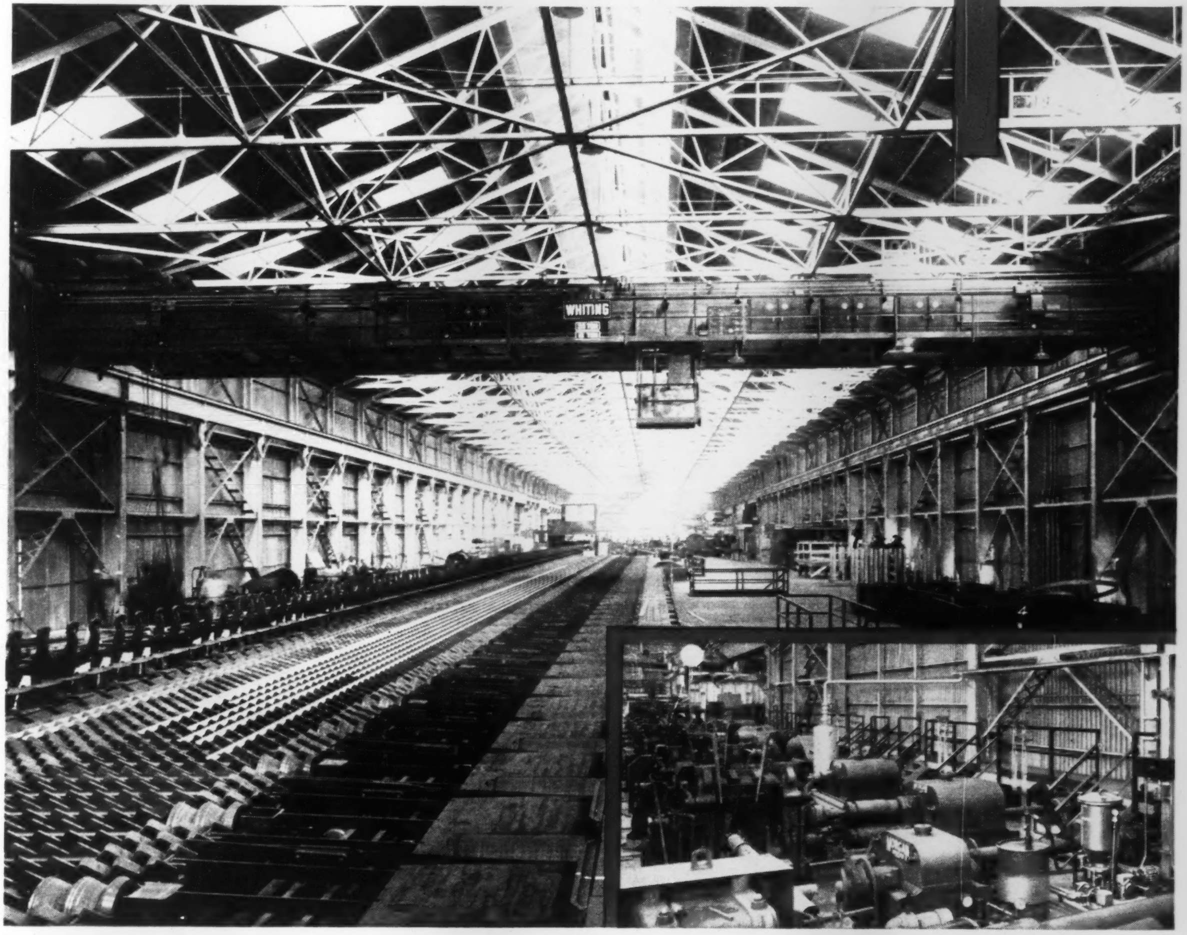

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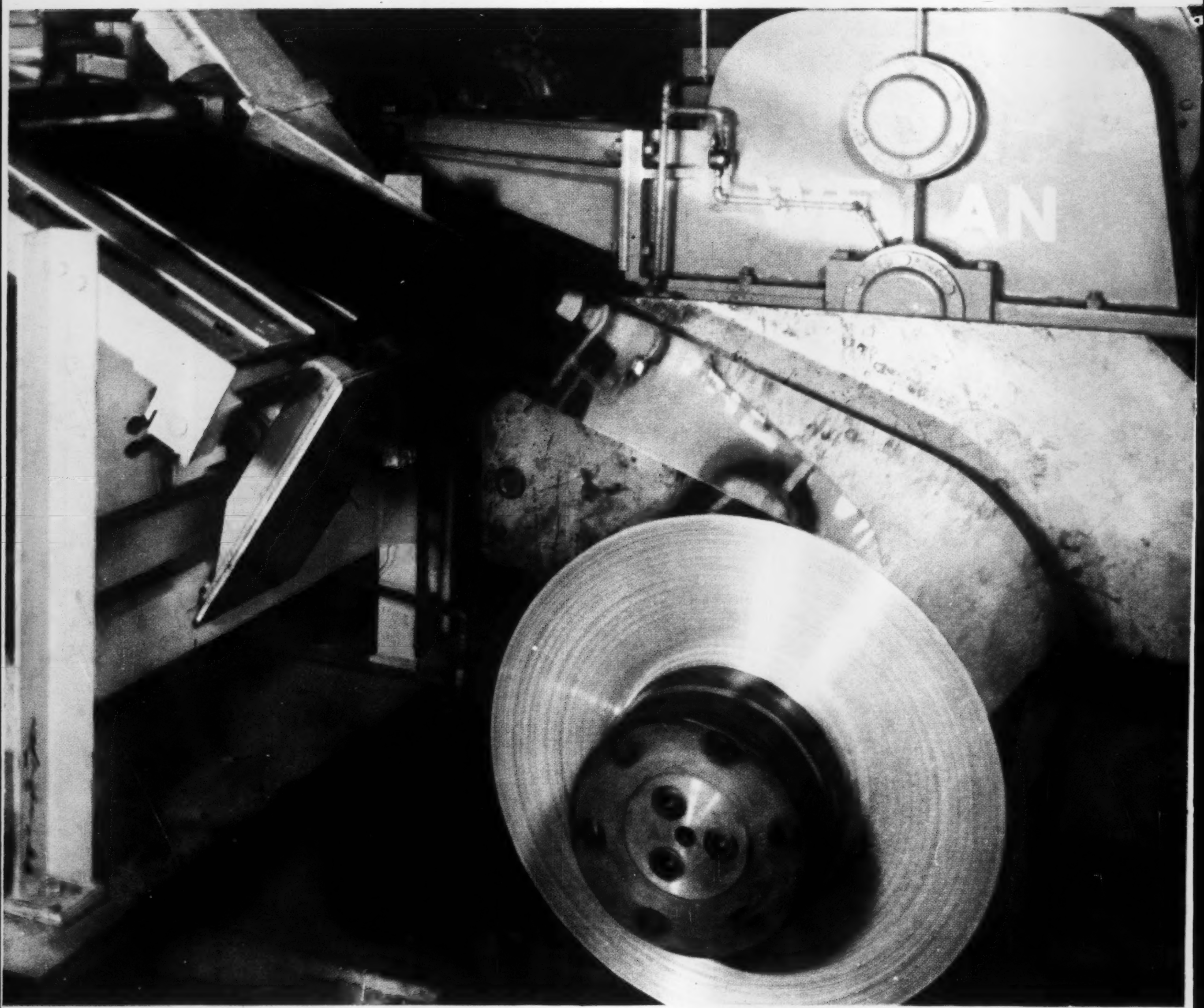

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